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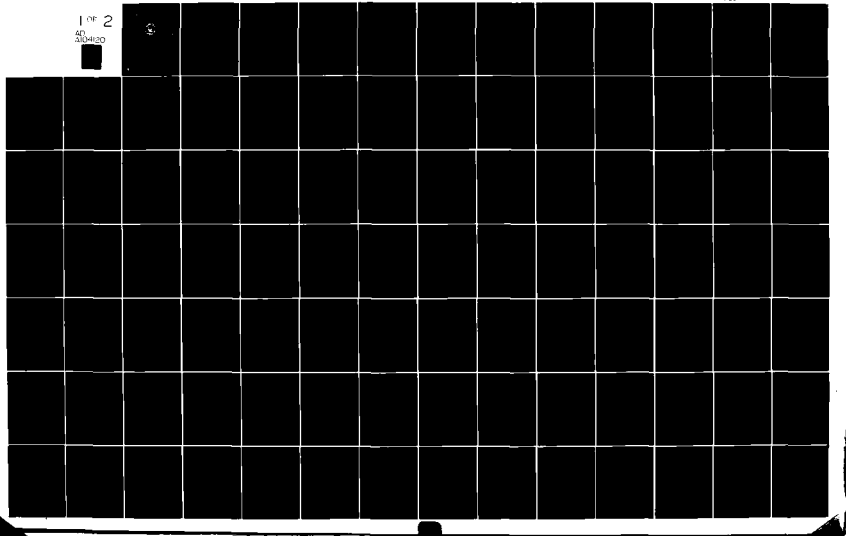

NAVAL POSTGRADUATE SCHOOL
Monterey, California

THESIS

ORGANIZATIONAL DESIGN CONSIDERATIONS
FOR THE NEW COAST GUARD WMEC-270

by

Thomas Edward Bernard

June 1981

Thesis Advisor: Carson K. Eoyang

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Records show extensive planning to determine the optimum physical structure as well as the optimum mix and number of personnel.

The purpose of this study is to develop the optimum organizational structure which will support the interaction between the people and the physical characteristics of the vessel.

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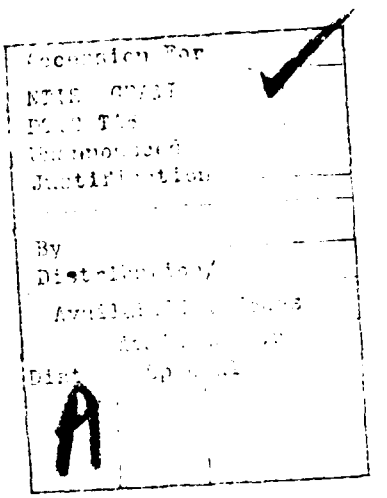
Three major factors were analyzed as part of this study. First, the operational requirements imposed on the vessel. Second, the environment which affects the vessel's ability to perform its operational requirements. Third, the availability of alternative design structures as determined from a review of the literature on structuring organizations.

Ultimately, a structural design is selected which best matches the organizational environment of the new Coast Guard WMEC-270 with its operational requirements in order to optimize the effectiveness of the new vessel.



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Organizational Design Considerations for the New Coast Guard WMEC-270

by

Thomas Edward Bernard
Lieutenant Commander, United States Coast Guard
B.S., United States Coast Guard Academy, 1970

Submitted in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE IN MANAGEMENT

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ABSTRACT

The Coast Guard will receive the first of a new class of vessel, the 270 foot medium endurance cutter, beginning during the late summer of 1981.

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The purpose of this study is to develop the optimum organizational structure which will support the interaction between the people and the physical characteristics of the vessel.

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I. INTRODUCTION

In the late summer of 1981 the Coast Guard will receive the first of a new class of vessel, the two hundred and seventy foot medium endurance cutter henceforth referred to as WMEC-270. A major objective in the design of any new class of vessel is to achieve optimum effectiveness through the utilization of the most recent technological innovation. A second major objective is to maintain the optimum effectiveness through the proper mix and number of personnel assigned. Optimum effectiveness is represented by achievement of established organizational goals for which the WMEC-270 was designed.

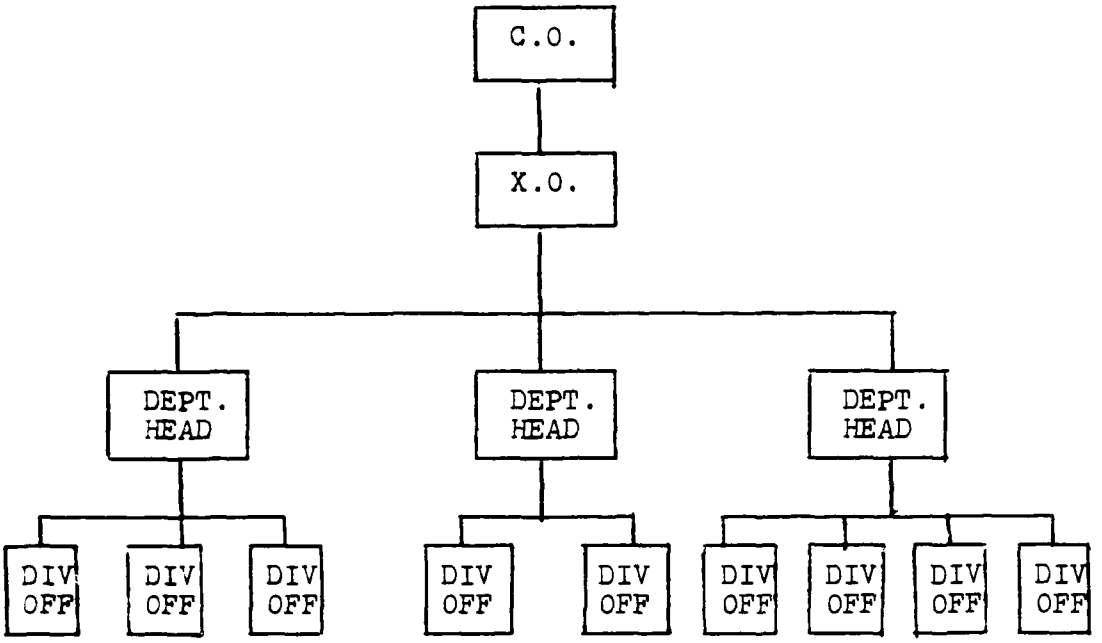
In reviewing the design of the WMEC-270 there is no doubt in my mind that the latest technological innovations have been incorporated. The major physical difference between this ship and its predecessors, the WMEC-210 and the WHEC-378, is that complex automated equipment has been incorporated into almost every aspect of shipboard operation; e.g., galley equipment, automatic tank sounding, automatic milstrip processing, and automatic recording of the quartermaster log. The main focus of the crew will be keeping the ship running rather than running the ship.

Most ship construction in recent years has been affected by fiscal constraints resulting in less than optimum physical characteristics. The design of the new WMEC-270 does not reflect any such constraint. From the physical perspective, it is hard to imagine a more innovative vessel.

The WMEC-270 does fall short of being able to operate in a fully automated mode. It requires personnel to maintain the vessel and its equipment, assist in the performance of its many missions, and provide for the safety and well being of the vessel and the crew.

The studies of personnel allowances and complement have been ongoing for several years and is still being debated in some areas. While the optimum mix and number of personnel is certainly important, I am sure that any deficiencies will be quickly discovered and corrected once the vessel begins operation. Therefore, although I have some concern that the present manning level was established without considering all needs such as in-port watchstanding requirements, I do believe the manning level will have no long term negative impact on the effectiveness of the vessel.

What does concern me is that there is little evidence that the planners placed any substantial importance on the organizational structure that would be used to control this new vessel's operation. If the importance of the new structure was recognized, there is no evidence that any design was considered that varied from the standard shipboard organization design (see figure 1). Certainly the ability of a unit to perform at its optimum is dependent on many factors. Three of the most important are the physical capabilities, the capabilities of the personnel assigned, and the ability of the organizational design to integrate the personnel skills and the physical skills.



C.O. - Commanding Officer X.O. - Executive Officer

Figure 1

Standard shipboard organizational structure
(slightly abbreviated)

Figure 2 is Leavitt's model for describing organizations (March 1965). This model essentially states that there are five dimensions of an organization: goals, technology, people, structure, and environment. Changes in any one dimension require adjustments in the others to insure optimization of the organization. It appears that the Coast Guard has spent much time and money developing the technology of the WMEC-270 while it may perform at less than optimum because insufficient consideration has been given to alternative organizational designs. Consequently, this study was undertaken to develop the optimum structure based on a comparative study of various alternatives and the advantages and disadvantages related to each.

Traditionally, ships have been controlled by a rigid vertical structure with the Commanding Officer at the top. Despite the growing complexity of Coast Guard vessels and the increased mission requirements, the control mechanism has remained virtually unchanged. The normal response to any new operational or administrative requirement is the establishment of another vertical channel in the structure. Several possible reasons for the similarity over time and across units include: first, the optimum design was discovered years ago when the structure was first implemented and there is no reason to change; second, Coast Guard planners believe the optimum design is presently being utilized and there is no reason to consider variances just because the vessel differs in age, complexity, number of missions, or crew mix; third, the organizational design is not

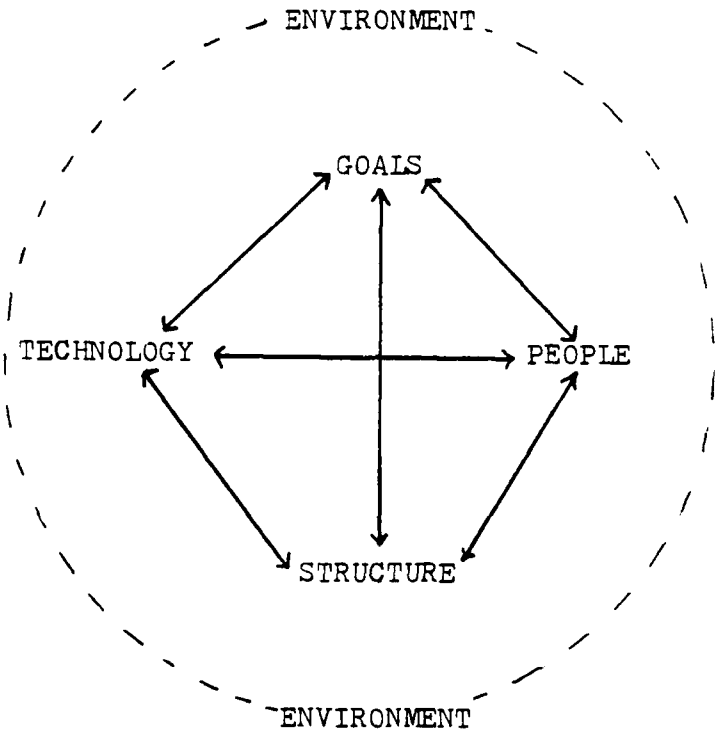


Figure 2

Leavitt's Model of Organizations

considered to be important or have an impact on the optimum effectiveness of a unit.

I disagree with all three reasons and agree with the Coast Guard Commandant when he stated on 16 January 1980 (State of the Coast Guard speech) that we have to be a little more aggressive and unconventional in how we achieve the personnel and work place support so needed throughout the service. I further agree with the seven objectives he stated in that same State of the Coast Guard speech - two of which relate directly to the importance of organizational design and organizational design considerations: objective four called for improved internal organization and management so the Coast Guard will remain vital, effective, and responsive; objective five expressed the need for innovative, cost-effective use of technology to manage the information explosion.

Organizational design is a technology that offers a wide range of possibilities. There are designs such as the hierarchy of the Catholic church that have been around for centuries and designs such as the four dimensional matrix recently adopted by some electronic firms. The success of any design over any other design within a given organizational setting is related to many factors that will be explored during the course of this thesis.

It is the purpose of the organization structure of any operating unit to process information, solve problems, and direct task accomplishment, keeping in mind the needs and desires of

the Coast Guard as well as the needs and desires of the personnel attached to the unit. It is the purpose of this study to identify the organizational design that performs these functions best.

II. HISTORY OF THE WMEC-270

The first step in a rational approach to organization theory is the establishment of goals to fulfill some need. Following a goal statement is the selection of a technology which will best achieve the established goals. A third step is to determine the mix and number of people necessary to match both the goals and the technology. The fourth step is the development of an organization structure which will guide the interactions of the people and the technology for the purpose of achieving the established goals. The fifth and final step is the fine tuning of the four previous steps in order to maintain a successful organization.

The development of the WMEC-270 has followed the first three steps of this rational approach. This chapter will review the action taken in each of those steps. The following chapters will consider certain aspects of the fourth step. The fifth step, probably the most important, is a continuous process which will begin once the vessel becomes operational.

A. GOALS

On 12 November 1974 an updated Cutter Plan (CG-380-4) was submitted to the Commandant indicating a need for a new class of vessel. This recommendation was the result of a process begun in 1973 which compared the mission requirements of the

Coast Guard with the capabilities, quantity, and anticipated longevity of the existing inventory of Coast Guard ships. The comparison clearly showed the growing disparity which exists between the Coast Guard's operating program requirements and the means available to accomplish them.[1] Seventy-five percent of the operational requirements included tasks related to search and rescue, enforcement of laws and treaties, and military preparedness. The remaining twenty-five percent were for tasks attributable to the marine environmental protection and marine science programs. Thus, the need and the goal to satisfy that need were established before there was any idea what the new cutter would look like.

B. TECHNOLOGY

During the two months following the submission of the updated Cutter Plan a feasibility study was conducted by the Offices of Operations and Engineering. This study recommended a medium endurance cutter over a high endurance cutter and was followed by a three month study which developed nine design alternatives. The preliminary design was approved by the Coast Guard Commandant on 24 December 1975.

During the next year the design of the WMEC-270 was formalized. In a memo to the Secretary of Transportation dated 5 November 1976, the Coast Guard Commandant requested authority

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[1]Transportation Systems Acquisition Review Committee Briefing held on 1 December 1976.

to proceed without delay in the acquisition of the first four WMEC-270's. The ship includes the following features:

a. Major Characteristics:

Length overall	270	feet
Beam, extreme	38.3	feet
Draft, full load	13.3	feet
Displacement, full	1730	tons
Speed (max)	19.7	knots
Endurance	21	days
Machinery, diesel	7000	horsepower

b. A navy provided LAMPS III (Light Airborne Multi-Purpose System) for military preparedness missions.

c. A MK 92 Gun Fire Control System in conjunction with a MK 75, 76 millimeter gun mount.

d. A Command Display and Control System (COMDAC) for integrating the following electronic subsystems: weapons, sensors, navigation, Combat Information Center (C.I.C.) and bridge functions.

Thus, almost two years after the need for a new cutter was ascertained, the technology for fulfilling that need was selected.

C. PEOPLE

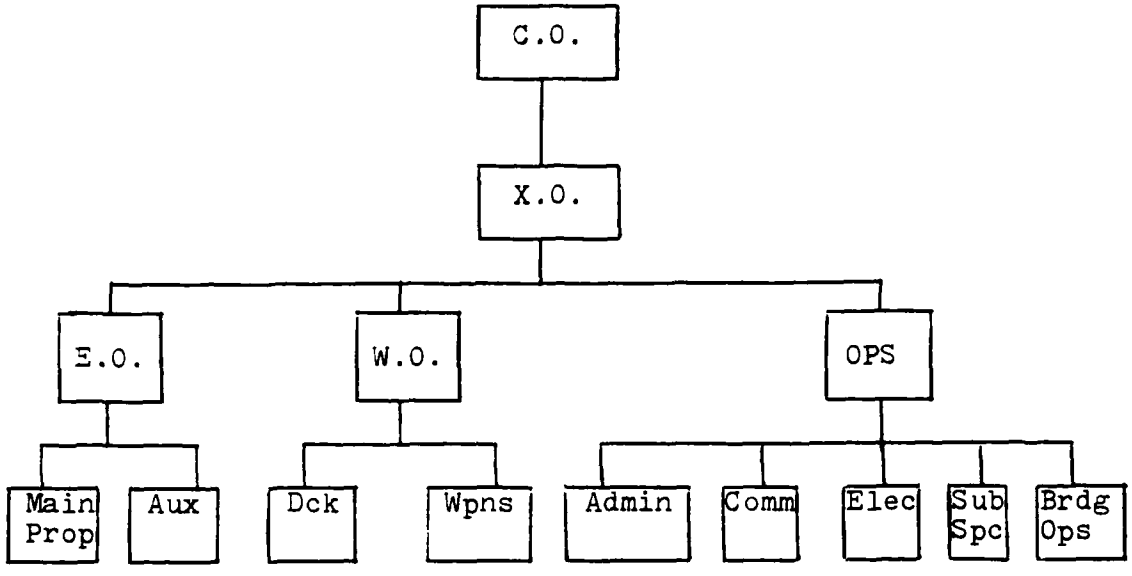
With the incorporation of the COMDAC System into the design of the WMEC, many of the routine functions previously performed by personnel were eliminated; e.g., quartermaster's log, fully automated C.I.C., and sounding tank sensors. Consequently, the

manpower requirements would be unique to any previously designed Coast Guard vessel. The major considerations were the personnel necessary to man emergency stations such as general quarters and the personnel required to maintain the vessel's advanced technology in working order. The present personnel requirements of the WMEC-210 and WHEC-378 were used as guidelines for determining the needs of the WMEC-270.

Phase I of a three phase manning analysis was completed on 25 March 1976 (Chief of Operations Memo 5320 dated 25 March 1976). The manning requirements were based on a fully self-sustained vessel. As of 23 September 1980 the following manpower requirements had been established: 9 commissioned officers; 2 chief warrant officers; 8 chief petty officers; 51 other petty officers; and 21 non-rated personnel. This allowance does not include those members of the aviation detachment who would normally be onboard whenever the vessel deployed. Studies of the manning requirements will no doubt continue and changes incorporated long after the vessel becomes operational.

D. STRUCTURE

There is no evidence that any organizational design alternatives were considered beyond the design used for virtually all Coast Guard vessels. Figure 3 displays this design as it can best be determined from the personnel studies. (WMEC-270 Project Officer Memo dated 22 July 1980)



C.O. - Commanding Officer

X.O. - Executive Officer

E.O. - Engineering Officer

W.O. - Weapons Officer

OPS - Operations Officer

Main Prop - Main propulsion Division

Aux - Auxiliary Division

Dck - Deck Division

Wpns - Weapons Division

Adm - Administration Division

Comm - Communications Division

Elec - Electronics Division

Sub Spc - Subsistence Specialist Division

Brdg Ops - Bridge Operations Division

Figure 3

WMEC-270 Organizational Design (best approximation)

E. DELIVERY

At present there are expected to be 13 WMEC-270's. The first four, BEAR, TAMPA, HARRIET LANE, and NORTHLAND, are scheduled to be delivered from Tacoma Boatbuilding between 18 August 1981 and 12 August 1982. These vessels will be first scheduled for deployment between 1 October 1982 and 6 June 1983. All four will be homeported in Portsmouth, Virginia.

III. LITERATURE REVIEW

Virtually every organization has a reason for existence which can be translated into the accomplishment of some task or service. Most authors use the term output to refer to the end product of organizations. According to Beer (1980) the output of an organization is considered complete when the task or service meets three performance criteria: effectiveness - meeting the specified goals established for the task; efficiency - utilization of resources only to the extent necessary for task completion with minimum wastes; and organizational health which is comprised of two major components - first, development of congruence among the goals of the organization, the employees, and society; second, the ability of the organization to recognize the need for change and implement corrective measures.

A. ORGANIZATION MODELS

One of the most widely accepted models used today to describe how organizations take inputs from the environment and return outputs to the environment is the social systems presented in figure 4. The conversion process used by organizations varies because characteristics of the inputs and outputs are different and also because environmental factors such as state of technology, availability of resources, and society goals

affect different organizations to different degrees. As a reaction to environmental influences beyond the control of the organization, conversion processes must be established which will achieve the desired output state.

Figure 5 visually displays the environmental factors as independent variables, the conversion process factors as intermediate variables, and the output factors as dependent variables. Organizational structure is the only intermediate variable being considered by this study. As a further limitation, the only structural dimension being considered is the organization design and the process resulting from that design. The reason for these limitations is that this study is related to a particular organization - the Coast Guard WMEC-270. Within the Coast Guard, changes to such conversion processes as training and supervision and even such structural dimensions as pay and promotion and accounting and control policies are largely established through servicewide procedures. Except in unusual circumstances, changes to these procedures are done throughout the Coast Guard without regard to how changes might affect the internal processes of an individual unit. Additionally, an operational unit has authority to change its design of internal structure and such changes do not generally require approval or servicewide adoption.

Many theories of organization structure have been generated and revised over time. The most widely accepted theory at present appears to be the contingency theory which Galbraith

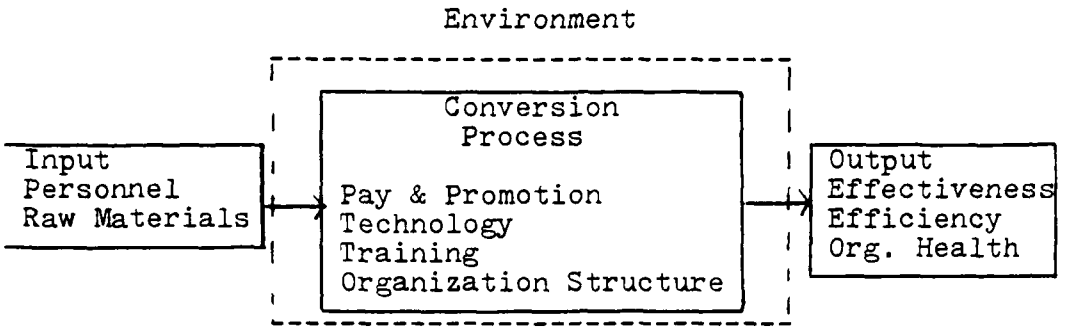


Figure 4

Systems Model

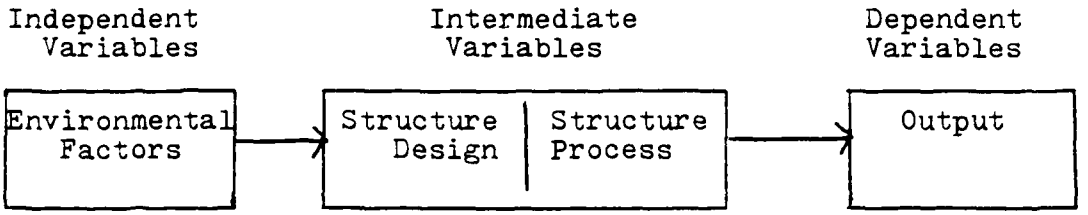


Figure 5

Systems Model - Organizational Relationships

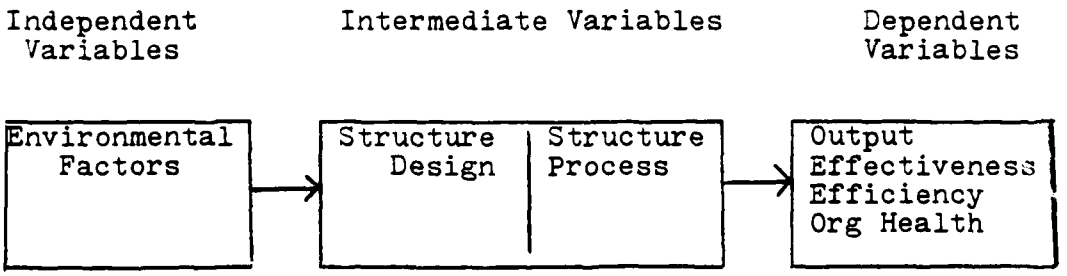


Figure 6

Systems Model - Dependent Variables

(1973) describes most simply as a theory based on two conclusions: there is no one best way to organize; and any way of organizing is not equally effective. Essentially the theory contends that to be successful, organizations must adopt a structure which best deals with the unique environmental factors affecting that organization.

Figure 5 is a skeleton model of the relationships between the independent, intermediate, and dependent variables. The following pages will attempt to fill in the dimensions of these variables beginning with the dependent and working back towards the independent. Figure 6 is the first step of this process. The dependent variables were described in the first paragraph of this chapter. Next follows a discussion regarding the intermediate variables.

B. ORGANIZATION STRUCTURE

Organizational structure can be described as both a static and dynamic concept (Kilmann, Pondy, and Slevin, 1976). As a static concept it is a chart which depicts the manner in which subunits are divided and the way in which responsibility and communications flow within an organization to facilitate integration of subtasks into the whole tasks.

Duncan (1979) describes the dynamic concept of organizational structure as the pattern of interactions and coordination that links the technology, tasks, and human components of the organization to insure that its purpose is accomplished. Others

go further by describing the actual linkages that structure should create in order to achieve an acceptable level of performance. Mintzberg (1979), for example, describes nine specific linking devices which should be used to hold organizations together. He has placed these nine parameters into four groups: design of positions; design of the superstructure (departmentalization); design of lateral linkages; and design of the decision making system. All four of these processes are accounted for through the four major functions of organizational structure (Khandwalla, 1977; Lippitt, 1973):

1. reduction of uncertainty through forecasting and planning;

2. conducting a wide variety of activities as a result of departmentalization and specialization;

3. integration of activities;

4. problem solving.

The static attributes of organizational structure, represented by the organization chart, can assume an infinite number of shapes, but are generally classified into broad categories. Summer (1976) and Beer (1980) use three categories while Khandwalla (1977) discusses seven categories. For the purpose of this study the five categories presented by Mintzberg (1979) will be used for comparative analysis. Mintzberg's five categories are: Simple; Machine Bureaucracy; Professional Bureaucracy; Divisionalized; and Adhocracy. These are the static designs, each possessing a unique set of dynamic attributes

so that the four functions of organizational structure can be accomplished. These dynamic attributes, more than the static design, separates one form from another.

The Simple structure is best characterized as non-structure. Coordination is achieved through direct supervision from the top on down. There are few departments and even fewer hierarchial levels. Forecasting, planning, and problem solving are generally the exclusive responsibility of the chief executive. Khandwalla (1977) labeled the managerial styles of these simple organizations as power-oriented, entrepreneurial, and seat-of-the-pants. For the most part, the simple form of structure is a temporary state that organizations, particularly new organizations, pass through during early growth periods.

The Machine Bureaucracy is characterized by a high degree of specialization, a proliferation of rules and regulations as well as other mechanisms to formalize behavior, and a division of personnel according to functional skills. The environment for these types of organizations does not exert much pressure, and what pressure is exerted remains mostly constant over time. Decisions are made high in the organization and staff personnel are given some power over line operators for the purpose of standardizing interdepartmental behavior. The primary thrust of the Machine Bureaucracy is to perform a large volume of routine tasks over a long period of time with a minimum of interruptions.

Training is the distinguishing characteristic of the Professional Bureaucracy. Through training, organizations in this category attempt to standardize skills to allow for a high degree of coordination between sub-tasks. Employees are permitted a great amount of latitude and control over their tasks because of the high level of professionalism they possess. The power in the Professional Bureaucracy is based on expertise rather than on position as in the Simple structure and the Machine Bureaucracy.

The Divisionalized form of structure is primarily suitable for large organizations and is basically represented by a series of Machine Bureaucracies or an occasional Professional Bureaucracy. Divisions can be based upon geography, market, product, or some other criteria. Each division is treated as a separate entity. The primary function of the overall structure is to ensure standardization of output and quality control. The structure is primarily used for large conglomerates and even then there is some argument whether the conglomerate is more effective than breaking the many divisions into individual enterprises.

The fifth and final structure described by Mintzberg and recognized by many other authors (although frequently called by different names) is the Adhocracy. This type of structure is characterized by a lack of formal behavior mechanisms. Members of the organization are given wide latitudes with respect to their jobs. There is a heavy reliance on personal liaison

rather than standard coordination mechanisms. Roles in an Adhocracy shift from person to person depending on the projects being developed or the tasks being performed and the expertise of the individuals. Power shifts regularly from one group to another depending on who has the fresh ideas and the greatest chance of success. Long term success is based upon short term success and managers must continuously promote new ideas without being inhibited by standard operating procedures. The matrix, an organization structure consisting of more than one communication and supervision channel, is the most common type of adhocracy in use today.

Figure 7 is a more complete representation of the relationship between the performance of an organization and the environment as it is buffered through a particular form of structure. As the model shows, all structures perform the same processes. It is the degree to which these processes are accomplished that makes each structure unique. It is the environment which must dictate the structure in order to achieve the proper degree of structural process; e.g., integration. The following discussion identifies those factors of the environment which are considered to have the greatest impact on structural design.

C. ENVIRONMENTAL FACTORS

The condition most often mentioned as a factor which influences structure is the degree of uncertainty. Galbraith (1973) defines uncertainty as the difference between the amount

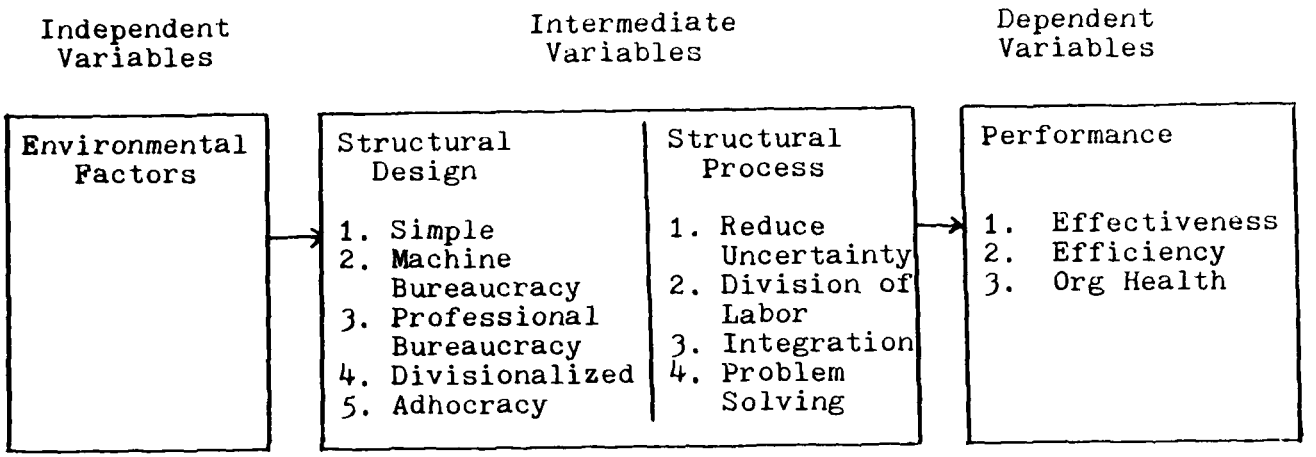


Figure 7

Systems Model - Intermediate Variables

of information required to perform the task and the amount of information possessed by the organization. More simply, degree of uncertainty is related to the need for information processing. The greater the uncertainty, the greater the need for information processing. Khandwalla (1977) also lists the reduction of uncertainty as a primary function of organizational structure and therefore the degree to which uncertainty exists in both the internal and external environment should influence structural design. Duncan (1972, 1979) believes that the degree of uncertainty is the overriding factor influencing structure. And Thompson (1967) goes even further to state that uncertainty appears as the fundamental problem for complex organizations, and coping with uncertainty as the essence of the administrative process. Mintzberg (1979) relates degree of uncertainty to static (low uncertainty) and dynamic (high uncertainty) environments. He states that dynamic environments will push organizations towards the organic type of structure with a stronger force than static environments will push organizations towards inorganic structures. In other words, an organization with a high degree of information processing ability will survive, perhaps at less than optimal efficiency, in a static environment where that information may not be necessary while an organization without that capability will not survive in a dynamic environment where it is necessary.

The need to reduce uncertainty through information processing can be satisfied in ways other than structural design modifications.

For example, the establishment of slack resources or installation of a complex computer based information system are both viable techniques for reducing uncertainty through increasing the ability of the organization to process information. But these alternatives are expensive and difficult to modify to keep up with the dynamic environment they were developed to buffer.

In pure objective terms it is not possible to measure uncertainty. It is easiest to study the various dimensions of uncertainty and subjectively ascertain to what extent these dimensions are present in the organization's environment. Some of the dimensions of uncertainty are: standardization of output; commonality and availability of inputs, both raw materials and personnel; routinization and repetition of subtasks; and clarity of organizational and divisional goals. The extent to which any of these dimensions are present determines the degree to which uncertainty exists for an organization. While no other environmental factor receives such universal acceptance as uncertainty, there are other factors which do exist and should be considered.

Davis and Lawrence (1977) list as a factor the presence of external pressure requiring an organization to focus on more than one aspect of its internal operations; e.g., external pressure in the form of competition may force an organization to focus on both cost efficiency and customer satisfaction. Khandwalla (1977) states that successful organizations must provide

for sufficient planning, coordinating, and problem solving mechanisms in their structure when outside pressures require the pursuits of several goals simultaneously. The greater the number of goals an organization pursues, the more difficult it is for the organization to standardize procedures, maximize goal accomplishment, and plan future activities.

Another factor which receives frequent mention as influencing structural design is the type and degree of subtask interdependence required for whole task completion. Thompson (1967) has identified three types of interdependence: pooled, sequential, and reciprocal. Pooled interdependence exists when the tasks within different divisions are performed independently utilizing resources shared between the divisions. Sequential interdependence exists when the final product (task) is the result of several subtasts being performed sequentially. Subtasks build on subtasks until the whole task (product) is completed. When the subtasks are shifted back and forth between work groups in various stages of development until the whole task is completed, the type of interdependence is called reciprocal. The greater the interdependence, regardless of type, the greater the need for integrating and coordinating mechanisms. Mintzberg (1979) and Duncan (1979) believe that reciprocal interdependence requires the highest degree of integration. Khandwalla (1977) states more simply that the greater the interdependence, regardless of type, the greater the need for integrating mechanisms achieved through increased lateral

relations and more communication channels. Lorsch (1976) argues that interdependence is an internal environmental state and that organizational structure must achieve a balance between the needs of this internal state and the needs of the external environmental state; e.g., customer satisfaction.

The number of end-products whether they be services, tasks, or products is a factor which should influence structural design. When the end-products are diverse, a more organic structure is needed to provide ample planning and integration (Galbraith, 1977). According to Mintzberg (1979), organic is defined as the absence of standardization within the organization. While similar end-products lead to standardization, the process of developing end-products which are highly diversified is less able to be routinized and therefore requires more integrating mechanisms which exist in organic structures (Khandwalla, 1977).

The necessity to share resources between the functional divisions of an organization is a situation which should also influence organizational design (Davis and Lawrence, 1977). When resources must be shared, a high degree of integration is necessary to insure tasks are performed properly and in accordance with organizational priorities rather than divisional priorities.

A final factor to be considered is the importance of a consistent effort from the organization. Consistent here means that the management is aware of and able to pursue organizational

goals. Khandwalla (1977) emphasizes that there are two sets of organizational goals - publicly stated long term goals and privately directed short term goals. Often these goals are quite different. Cyert and March (1965) argue that the privately directed short term goals are controlled by the managers who make decisions for the organization. In organic structures decisions and the reasons for those decisions are more widely known throughout the organization than in inorganic structures where decisions are often made at higher levels for reasons which are not shared with the lower levels. Hence, the risk of goal displacement, the pursuing of privately directed short term goals in lieu of publicly stated long term goals is more likely in organizations which have vague goals or are controlled by an inorganic structure.

D. DESIGN SELECTION

Based on the foregoing discussion, the relationship between environmental factors and operational performance first presented in figure 5, can now be represented in greater detail, figure 8. The independent variables (internal and external environmental factors) generally cannot be manipulated by the organization. (One exception is when a Commanding Officer lobbies to remove a vessel requirement due to time constraints.) Instead, the existing factors are recognized and an appropriate structural design is selected which will result in a sufficient degree of information processing, integration, differentiation,

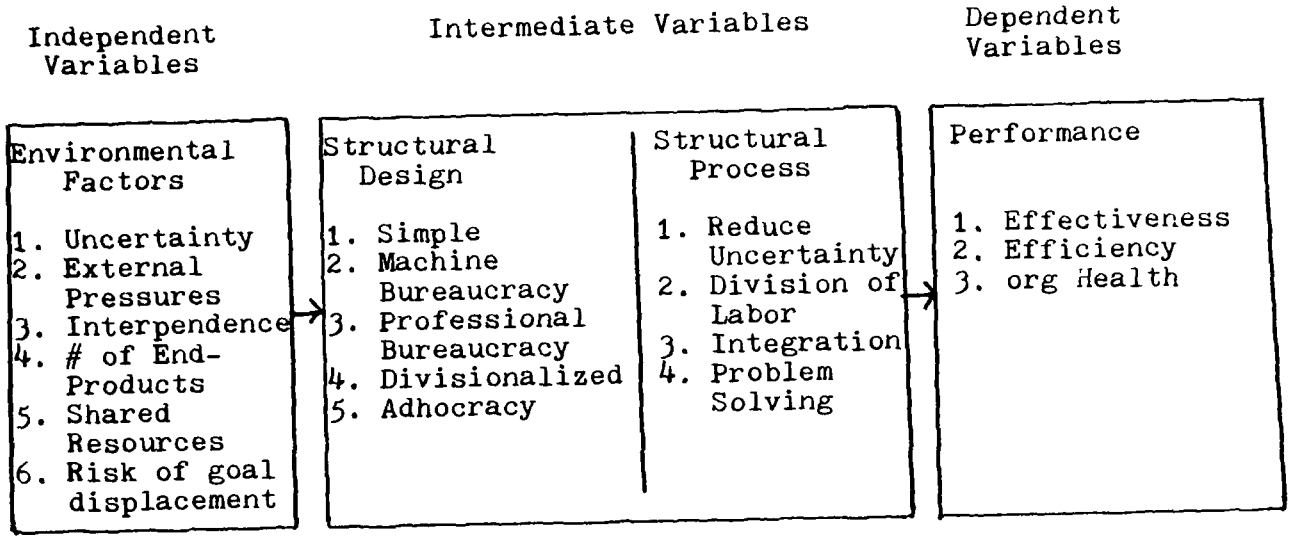


Figure 8

Systems Model - Independent Variables

and problem solving to allow the organization to achieve all three performance criteria (the dependent variables).

According to Hall (1972) the specific form an organization takes is dependent upon the environmental conditions it faces. But before the basic question of which structural design to choose for a particular organization can be answered, two problems remain to be solved. First, how does the organization recognize and classify the environmental factors? Second, what structure is most appropriate to deal with a particular set of environmental factors? Since it is easiest, the second problem will be resolved first.

Table 1 represents the five structural designs being considered in this thesis and a summary of the environmental factors in which they should theoretically flourish. Theorists and practitioners of organizational structure have made it easy to select a particular design given a particular set of environmental conditions. The difficulty exists in placing the conditions into a particular set.

The difficulty in classifying the environment of a given organization is not easily resolved. The reason for the difficulty is that most of the dimensions of the environment are relative terms; e.g., degree of uncertainty; degree of standardization; goal clarity; number of rules and regulations; etc. Some authors have attempted to simplify the problem through the development of decision models.

Table 1
Relationship Between Environment to Structural Design

ENVIRONMENTAL FACTORS	COMPLIMENTARY STRUCTURE
1. a) New, small company b. Manager involved in all processes and decisions c) Few rules or regulations d) Frequent adjustment of procedures to find best technique e) High degree of uncertainty	1. Simple
2. a) Established firm b) Standardized outputs c) Many rules and regulations d) Clear goals e) Stable external pressures f) Technology permits routinized and repetitive sub-tasks g) Low degree of uncertainty	2. Machine Bureaucracy
3. a) Established firm b) Diversified outputs c) Stable but general goals d) Sub-tasks require high degree of training and expertise e) Level of expertise determined outside of the organization f) Moderate to high degree of uncertainty	3. Professional Bureaucracy
4. a) Large conglomerate-many sub-units b) Standardized output c) Little integration between sub-units d) High routinization within sub-units e) Diversified markets or products f) Clear operational goals g) Low to moderate degree of uncertainty	4. Divisionalized Form
5. a) Any size firm but generally young b) Frequently changing goals c) High degree of competition d) Rapidly changing or modifying products e) High technology f) High degree of uncertainty	5. Adhocracy

Perrow (1970) first developed a matrix for classifying the environment. He classified the environment into two sets of dichotomies. The first set, based on the internal environment, is categorized as simple or complex. The second set is based upon the external environment and categorized as stable or dynamic. Figure 9 displays this matrix and the types of organization structure related to each environmental category.

Duncan (1979) has gone one step further than most other authors and has established an Organizational Design Decision Tree based upon the two dichotomies developed by Perow. Figure 10 displays Duncan's decision model.

There is a common weakness to all attempts to model organizational design decision theory. The authors universally seem to dichotomize the dimensions of the environment which are truly relative terms. Concepts such as centralization, complexity, stability, etc. are more effectively utilized when comparing one organization to another rather than comparing one organization with its environment. This leaves the structural designer with the following course of action: subjectively categorize the environment and what factors are affecting it and select a complimentary structure. If the performance criteria are not accomplished with this goal the organization must analyze whether to modify the structure, some other internal process, or both in order to achieve the desired output.

The use of this technique for determining structural design raises one other concept of organization structure which is

	STABLE	DYNAMIC
Complex	Professional Bureaucracy	Adhocracy (decentralized)
Simple	Machine Bureaucracy	Adhocracy (centralized)

Figure 9

Perrow's Environment Classification Matrix

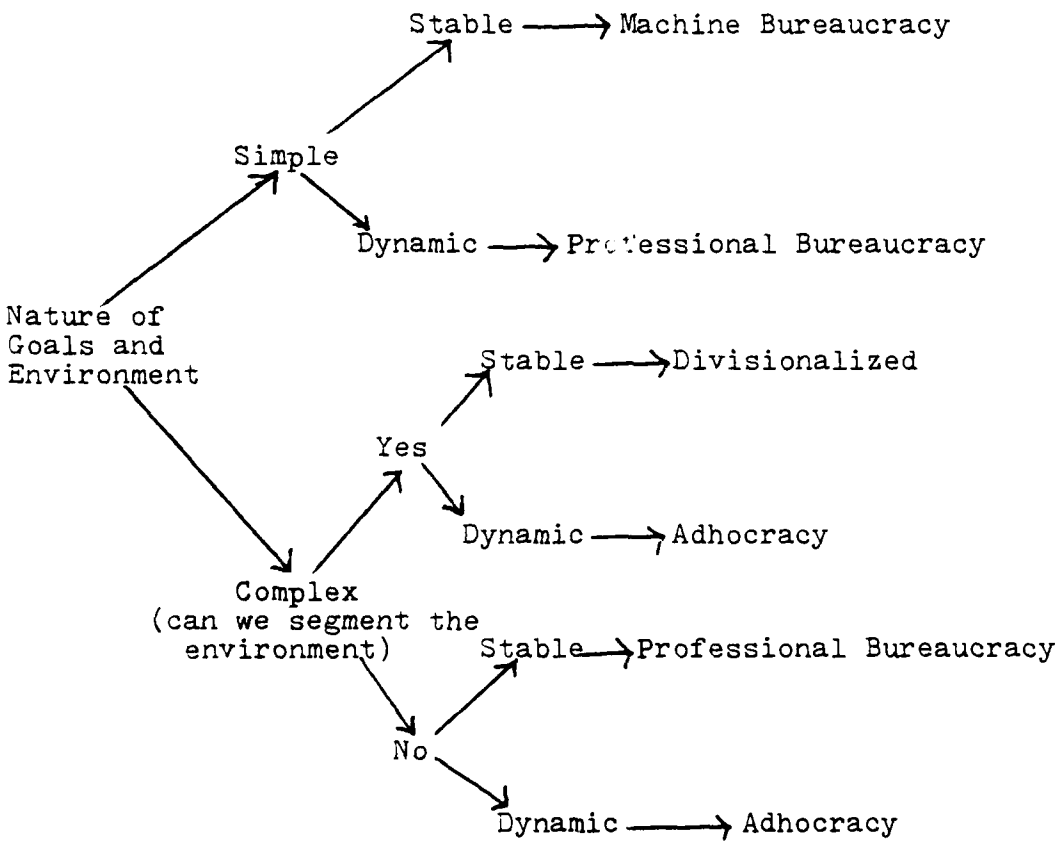


Figure 10

Duncan's Structural Decision Model (slight personal modifications to conform to Mintzberg's design alternatives)

very important for the long term success of the organization. The concept is called morphogenesis which basically means the ability of an organization structure to develop and change form to meet changing conditions.

The value of a morphogenic structure is emphasized as a result of two common situations. First is a situation where a structure is designed to complement the perceived environment and the result is unsuccessful. The second situation is when a structure is selected to complement a perceived environment and is successful until the environment changes. In both situations it may be necessary to modify the structural form. If this form is so ingrained in the organization that it cannot be adapted to fit new situations then the organization will either die or perform less than optimally. A morphogenic structure which is adaptable over a wide range of environments will help an organization achieve long term success.

In today's contemporary organization which employs more sophisticated technology and more educated employees than in years past, change will occur and must be met with many organizational adaptations including frequent modifications to organizational structure (Khandwalla, 1977).

In summary, when developing a structure for an organization, the manager(s) must analyze the existing environmental factors and select a structural design which provides for an adequate degree of differentiation, integration, information processing, and problem solving capacity. In addition, the design should

ideally be flexible enough to be easily modified to react to less than optimum performance or changing environmental factors.

IV. VESSEL OPERATIONS

The purpose of this chapter is to analyze the activities of the WMEC-270 both from the environmental factors that require them and the internal mechanisms used to control and coordinate them. Since the WMEC-270 is not yet in operation the analysis will be based primarily on the activities of vessels such as the WMEC-210 and WHEC-378 which perform similar activities.

A. MISSION REQUIREMENTS

According to the draft copy of the Logistics Support Plan the WMEC-270 will be expected to perform the following peacetime missions: Enforcement of Laws and Treaties (ELT); Search and Rescue (SAR); Marine Science Activities (MSA); and Military Preparedness (MP).

Activities within the ELT program can be placed in one of two major divisions: decisions regarding fishing within the 200 mile contiguous zone of the United States and enforcement of federal laws regarding smuggling (over the water) contraband such as narcotics, fire arms, etc. The successful conduct of these activities requires two contributions: preparation and execution.

Preparation for ELT activities involves key individuals acting in highly professional manners. Generally the leader of such activities; e.g., the Boarding Officer, has been through

several weeks of intensive training. He or she and a few others in the boarding party must keep current on all the latest regulations which outline policies and procedures and effectively dictate the desired behavior of both the boarding party and the base ship (in this case, the WMEC-270). It is particularly crucial that the Boarding Officer keep the Commanding Officer appraised of current procedures as well as current surveillance reports to which the Commanding Officer must respond. Without constant preparation, successful execution could not occur.

The execution of ELT activities such as surveillance and boarding operations could result in the development of many scenarios; e.g., hot pursuit or boarding a hostile vessel. Consequently, such activities require the attention of the entire Coast Guard Cutter crew. Routine daily activities are generally suspended during surveillance or boarding operations. This is a period of intensive communication concerned with monitoring the ELT activity and appraising the operational commander;e.g., District commander, of actions being taken and actions being contemplated. Those personnel who have the responsibility for conducting the activities; e.g., the Commanding Officer and members of the boarding party, must communicate directly, must share the knowledge they possess, and must act in accordance with that knowledge. There is no time for research and review of procedures relating to boarding and search. Success is dependent upon the decisions of those people closest to the activity such as members of the boarding

party. Decisions must be made with little regard to the formal chain of command.

Search and Rescue (SAR) activities are similar in intensity to ELT activities. Most of the routine SAR tasks such as determining search area, track spacing, etc., have been computerized and are the responsibility of Rescue Coordination Centers (RCC's) located throughout the United States and Puerto Rico. Although these routine tasks are performed by the RCC's, the ship (WMEC-270) is still required to train and be prepared to accomplish these tasks as well as prepare for the actual search execution through such activities as simulated search patterns, coordinated air and surface exercise searches, and regular SAR drills which result in message traffic only. The planning of SAR activities requires a high degree of individual professionalism and interdivisional coordination between such divisions as communications, bridge operations, combat information center (CIC), deck, and weapons.

The execution of a SAR case is divided into two phases - the search phase and the rescue phase. The search phase can go on for days and while there is a continuing need for coordination of subtasks, there is time to accomplish other tasks unrelated to the SAR case and also to review procedures to insure past and future decisions are in accordance with Coast Guard policies. Should the search phase prove successful the rescue phase would normally follow unless other units were present or soon arriving and were more suited to perform the rescue effort.

The rescue phase is generally a period of intense activity. A high degree of coordination and instant decision making are required of many key personnel such as the Commanding Officer and boat coxswains for the operation to be successful. Quick and timely actions are essential. Members of the rescue team must allow the existing conditions to influence their training; and they must make decisions and take action based upon accepted Coast Guard practices and situational necessity. The rescue phase requires the utilization of the best and most experienced personnel on board with little regard to rank or hierarchial position.

Planning for Marine Environmental Protection activities requires the attention of certain personnel who share numerous other responsibilities. It is common for almost all shipboard personnel to have the responsibility for more than one operational and administrative activity. MEP personnel must maintain an awareness of current procedures; and must maintain frequent liaison with other organizations more directly involved in MEP such as Coast Guard Strike Teams and Coast Guard staff and technical representatives working in the areas of MEP.

The execution of MEP activities can range from routine monitoring of oil spills or potential oil spills to intensive operations for preventing the spread and facilitating the clean-up of hazardous chemicals. Often times during intensive operations the Coast Guard cutter is little more than a platform from which cleanups are conducted using special equipment and

people made available to the cutter from other units. These people often possess the technical skills necessary for successful completion of the activity and because they are not part of the cutter's chain of command, communications must flow along nonstandard lines. Once again, the primary coordinator, generally the Commanding Officer of the Coast Guard cutter, must communicate directly with those persons on board with the greatest expertise regardless of the established rank structure.

The Military Preparedness mission of the WMEC-270 requires the continuous practice of several subactivities such as anti-submarine warfare (ASW), surveillance, and defensive anti-surface warfare. The actual activities are rarely performed (Vietnam and World War II being notable exceptions); but they are well prepared for utilizing frequent rehearsals under simulated conditions. Personnel such as the weapons and ASW officers are highly trained and charged with the responsibility for keeping the Commanding Officer and the entire vessel informed of new procedures and any situation that would prohibit the vessel from performing Military Preparedness activities.

An example of Marine Science Activities is recording temperatures at various depths or taking ocean samples at specified depths. These activities are less frequent and relatively low key in comparison with other operational activities, but they do follow a similar pattern of preparation and execution. Preparation requires professional behavior from a few key personnel who must interact directly with the on board scientists

or the activity sponsoring the particular set of Marine Science Activities being planned next. The execution of these activities is short lived but requires a high degree of coordination throughout the Coast Guard cutter to be successful. Again, people must share their knowledge through open communication with anyone who could be affected or could affect the planned activity without regard to their position within the chain of command.

B. ADDITIONAL ACTIVITIES

Besides planning for and executing these primary missions there are many other activities which indirectly support mission areas and must be performed regularly. These activities include: personnel training, counseling, administration, routine vessel maintenance and repair, and extensive vessel maintenance and repair. Except during periods of intensive operations such as a SAR case, these activities must be constantly coordinated with primary mission areas.

Personnel training, counseling, and administration involves all levels of the Coast Guard cutter. Just as the Commanding Officer is responsible for the development of the officers on board, the third class petty officers are responsible for the development of the non-rated men and women subordinate to them. To be effective, personnel considerations must be integrated into every decision making process and every operational activity. Some examples include:

1. pending personnel transfers should be considered when planning future deployments of the vessel;

2. future operations should be considered as training opportunities as well as unit performance opportunities;

3. personnel counseling should always occur following a subordinate's attempt to perform in a new area and should be periodically conducted on all subordinates regarding routine performances.

If a vessel hopes to attain long term operational success, these personnel activities must be performed with regularity and the same degree of professionalism afforded operational missions.

In addition to personnel activities, routine maintenance and repair must be integrated into both short and long term planning and decision making. Most maintenance and repair activities are routine and intradepartmental. If these activities are not performed properly, the ability of the cutter to perform primary missions will be threatened. These activities will only be performed well if they are effectively integrated with vessel operations.

Periods of extensive maintenance and repair are generally scheduled well in advance so that operational missions will not be affected by the inability of the ship to get underway. Consequently, it is not necessary to coordinate extensive maintenance and repair activities with operational missions except when developing the vessel's operating schedule. It is necessary however, to integrate the planning of major maintenance

and repair work with the vessel's normal operating routine in order to maximize the effective utilization of scheduled repair work; e.g., vessel drydocking. Some elements of planned maintenance and repair such as major ship alterations (SHIPALTS) must be submitted a year or more in advance to insure that they are included in the total work package. As the period for extensive maintenance and repair approaches, the planning and scheduling of activities takes on a higher and higher priority. The people most responsible for a successful maintenance and repair period, such as the Engineering Officer or the Electronics Material Officer, rise in relative importance within the organization. They become the experts who assume or are given the responsibility of sharing their knowledge and coordinating the activities.

There is one more set of activities required of all Coast Guard Cutters and the WMEC-270 will be no exception. The set includes the planning and execution of routine and emergency operational functions. Precision anchoring and navigation are examples of routine operational functions while fire fighting and flooding control are examples of emergency operational functions. Some of the simpler tasks required for preparation of these activities are controlled through established checkoff lists; e.g., inspection of fire hoses and checking the accuracy of the gyro and steering compasses. Other more complex tasks, such as dropping the anchor require frequent rehearsals to coordinate interdepartmental responsibilities. For the most part,

these rehearsals require the involvement or at least the attention of all hands.

The actual execution of the routine operational functions is very similar to the rehearsals with one notable exception - a major error such as a missed navigational course change could result in serious consequences; e.g., vessel grounding. For the execution to be successful participants must behave in accordance with their professional training with minor situational adjustments necessitated by uncontrolled and unplanned factors such as the presence of another vessel or the absence of an expected navigational aid. During these functions, the Commanding Officer must maintain as many communication channels as possible while maintaining full awareness of the environment surrounding his or her vessel. Large quantities of information must be processed quickly and accurately by the Commanding Officer as well as other key participants such as the navigator and the officer of the deck. Information flow cannot be limited to official channels because the channels could become overloaded resulting in blocking or restricting changes to important conditions.

The behavior desired during execution of emergency functions is approximately the same as the behavior that the rehearsals attempt to create. Unfortunately the conditions surrounding the actual emergency are far different from the conditions experienced in the rehearsals. Fire fighting is generally not practiced in the presence of real fire and deadly smoke, nor

is flooding control rehearsed while standing in two feet of water with more coming into the compartment. Besides these conditions there is one other major factor which distinguishes the execution of emergency operational functions from both the rehearsal of emergency operational function and the execution of routine operational functions - mistakes are measured in terms of their resulting effect on the situation, and even minor memory lapses or short delays in decision making can have disastrous results.

During emergency operations the role of the Commanding Officer is often minimized. Decision making shifts to those persons closest to the action who have the greatest amount of information. For example, the head of a repair party is close to the action and the ultimate success of the vessel rests on the ability of the repair party head to assess the situation and take appropriate action based upon both his or her professional training and the existing conditions.

C. ACTIVITY CLASSIFICATIONS

Depending upon the degree of operational intensity and the degree of interdepartmental coordination required, the activities of a WMEC-270 can be grouped into three categories. The first group (Group I activities), I will categorize intense inport activities, requires a high degree of intensity but a low degree of coordination. These activities include vessel drydocking, dockside availability and other scheduled maintenance and repair activities (most often referred to as Charlie periods).

Routine inport and underway activities are represented in the second category (Group II activities). This group requires moderate degrees of intensity and moderate degrees of coordination. Included in this group are non-scheduled maintenance and repair activities, Marine Science Activities, planning activities for all other mission areas, and routine operational functions such as navigation and precision anchoring.

The third group (Group III activities), is categorized as requiring a high degree of intensity and a high degree of interdepartmental coordination. Activities in this group include all missions (except MSA listed in the above group) and emergency operational functions.

In addition to operational intensity and interdepartmental coordination each group possesses other characteristics that distinguish one group from another. Those characteristics which relate to the environmental factors identified in Chapter III and outlined in figure 8 will now be discussed with respect to their presence within each of the groups of activities.

The first factor (considered by many authors to be the most important) is degree of uncertainty. Some dimensions of uncertainty already discussed include: standardization of output, commonality and availability of inputs, routinization and repetition or sub-tasks, and clarity of organizational and divisional goals. In overall uncertainty Group I activities rate low, Group II rate moderate, and Group III rate high for the reasons outlined in Table 2. Consequently, different levels

Table 2
Degree of Uncertainty

Uncertainty Dimension	Group I	Group II	Group III
Standardization of output	While each department has different outputs in maintenance and repair status, the intra-departmental outputs are standardized. One drydocking is similar to the next, one hull painting looks like the last one, etc.	No identifiable output for these activities. They are continuous.	Although termination of these activities is clear, there is no tangible output.
Commonality & availability of inputs (materials)	Generally available as a result of advanced planning for scheduled maintenance and repair activities-usually the same or compatible with materials used in the past.	Not always available due to premature equipment failures. As a result of non-availability, dissimilar materials may be substituted requiring installation and operation adjustments.	Through advance planning, every effort is made to insure that materials used for these activities are on hand and similar to previously used materials.
Commonality & availability of inputs (personnel)	While there will always be individual differences, personnel are most similar when working on extensive departmental projects; e.g., electrical skills possessed by one EM2 should be very similar to those possessed by any other EM2.	These activities frequently require personal skills not included in normal rate descriptions; e.g., counseling, training, teamwork. Consequently, personnel utilized for these activities do not often possess the (continued)	A high degree of training goes along with preparation for these activities, but due to regular turnover and normal absenteeism, the availability of trained personnel is not (continued)

(Table 2 continued)

		same skills as those required or those similar skills as possessed by people utilized previously.	always possible. Unforeseeable circumstances such as personnel injury during an emergency also contributes to the potential nonavailability of key personnel.
Routinization & repetition of sub-tasks	Sub-tasks can easily be routinized because they are repeated over specific periods of time; e.g., annually, quarterly.	Some difficulty arises in routinizing these activities because they are based more upon immediate and short term needs than long term planning of repetitive operations. There are some regularly scheduled reports that permit routinization.	These activities are very difficult to routinize because generally every emergency situation is unique. There are different factors which must be integrated into the planned operation.
Clarity of organizational and divisional goals	Goals for these activities are very clear. Complete the assigned tasks in the proper manner within the scheduled time period; e.g., three week dockside availability.	Some goals such as submission of quarterly reports are clear. Other goals such as conduct orderly watches and maintain internal cleanliness are less clear.	The overall goal of overcoming the emergency may be clear, but it is difficult to assess in advance what specific objectives will contribute effectively to goal accomplishment.

of information processing are required for tasks within each of the groups. Group I activities require the lowest level of information processing while Group III activities require the highest level of information processing.

Another environmental factor already identified as impacting on organizational design considerations is external pressures. Specifically this factor refers to how many different external pressures influence the internal emphasis placed on unit activities. The WMEC-270 is controlled first by the Commander of the District where it is operating, second by Commander of the District where it is homeported, third by the Commander of the Area in which it is operating,[2] and fourth by the Commandant of the Coast Guard. All of these sources of control can exert external pressure on the vessel to concentrate on particular activities of concern. Also, within a source of control there are multiple sources of external pressures such as personnel, military readiness, and engineering. Each of these divisions within a District or at Headquarters will attempt to influence which WMEC-270 activities should get the most attention. As the degree of influence changes, the WMEC-270 must be able to respond with internal shifts in emphasis without totally disrupting other operational activities. These multiple external pressures are particularly

[2]The Area Commander could be the primary source of control if the vessel is operating beyond the boundary of any District Commander or the vessel is assigned to the control of an Area Commander for a specific operation.

noticeable with Group II activities which involve long range planning of a wide variety of mission requirements and administrative support tasks.

Interdeperdence is another environmental factor which should influence structural design. During scheduled periods of maintenance and repair (Group I activities) there is very little interdependence between divisions and departments. As a general rule, each department would schedule its activities and accomplish its tasks with a minimum of assistance or interaction with the other departments. Routine underway and inport activities (Group II) require a moderate degree of interdependence. Each department must share its resources, money, time, people, etc. with other departments and coordinate its activities so that the maximum amount of planning, training, and preventive maintenance can occur with a minimum of disruption. Those tasks which require a high degree of intensity (Group III activities) also require a high degree of interdependence. If success is to be the outcome (lives often depend on a successful outcome) then all departments must be committed to the task at hand. In addition, the department's committment to the task must be coordinated with other department efforts to support the whole task. Without proper input from one department such as weapons, the input of another department such as operations will be futile.

Another environmental factor which should be considered as a possible influence of structural design is the number of distinct units of output. Characteristics of these output units include: output is related to specific task or mission, the output is required and monitored by external sources, and the people involved must be able to clearly identify that the output is complete. Some examples of units of output are: engine overhaul, SAR case, fire extinguishment, quarterly report, and reenlistment interviews. Some examples of completed tasks which are not considered units of output are: disciplinary and congratulatory counseling, submission of non-required correspondence, and routine preventive maintenance. Group I activities have limited and clearly defined outputs. Intensive inport periods are normally scheduled for a specific purpose such as main engine overhaul or drydocking; and when they're not, tasks with specific outcomes are scheduled for the period; e.g., refinishing the main deck. These outputs directly support mission accomplishment, are required and monitored both internally and externally, and are clearly identifiable as finished products when completed. Routine inport and underway activities (Group II) contain many clearly defined outputs such as submission of required reports and conduct of specified training. Group II activities also include many ongoing tasks without clearly defined outcomes such as personnel performance counseling, indoctrination of new work group members, dealing with matters relating to military civil rights, and conduct of routine

maintenance and repair. For most of the activities in this group it is difficult to ascertain when the old tasks end and the new tasks begin. This is a sharp contrast to Group III activities which possess easily identified beginning and end points. For example, a fire marks the beginning of an emergency; its extinguishment and cleanup mark the end. The difficulty with Group III activities is determining the success of the outcome. The search phase of a SAR case may be performed perfectly by a Coast Guard vessel and still not result in a completed rescue. To label the effort successful would be inaccurate; to label the effort unsuccessful would be unfair. As another example, how fast must a fire be extinguished for the effort to be labeled as successful? Essentially, both the quantity and quality of outputs from Group I activities can easily be determined; Group II activities include many tasks without clear outputs; and the quality of Group III activity outputs can best be determined through subjective judgement on the part of observers or investigators such as the Commanding Officer or District staff personnel.

Another environmental factor to be considered when developing a structural design is the degree to which resources are shared. Time, manpower, and money are examples of the resources of concern in this environmental factor. There is little sharing of these resources for Group I activities. Funding for intensive maintenance and repair tasks is generally a high priority and would not suffer during normal budget allocation exercises.

Time for performing these tasks is normally incorporated directly into the operating schedule so conflicts will be minimized. Each department performs its functions with a minimum of manpower assistance from the other departments. Funding for Group II activities is not a high priority and a great deal of interdepartmental cooperation is necessary to insure that available funds are shared. Group II activities have whatever time is left after scheduled Group I activities and unscheduled Group III activities; and this available time must be shared between such Group II activities as routine maintenance and repair, training for Group III activities, and planning for Group I activities. Successful completion of Group II activities would not be possible without a high degree of manpower resource sharing between departments. Once a Group III activity is initiated, funding is not a concern to the vessel. All available physical resources will be utilized to overcome the emergency. Time is also not a factor. (In some Search and Rescue cases both time and funding do act as constraints after a few days of searching with negative results.) Manpower is extensively shared during Group III activities. Boat crews and repair parties are comprised of personnel from all departments. With the exception of watchstanders, virtually all crew members are made available to assist the vessel in mounting any intensive operation.

A final environmental factor which could influence structural design is the risk of goal displacement. In this context,

risk has two dimensions. First, the risk that the organizational goals can become secondary to the unit's goals. Second, the severity of the impact on the organization if such goal displacement occurs. Group I activities have a low possibility of displacement and also rates low in severity if such displacement occurred. Since so many tasks are being performed simultaneously during Group II activities there is a high chance of goal displacement. For example, the Commanding Officer could easily develop a prioritization of routine inport and underway activities by the way he or she rewarded and evaluated subordinates. In general, the severity of this displacement is not very great. There is so much monitoring of cutter responsibilities that tasks which held a low priority for any duration of time would be identified and forced into a higher priority category by external sources such as the district inspection team. Group III activities normally occur one at a time with long time lapses in between. They are very visible activities and desired outcomes are common knowledge throughout the unit and the operational command. Consequently, like Group I activities, the risk of goal displacement is small; but, unlike Group I activities, the degree of severity if displacement does occur is very high. For example, if the Commanding Officer decides to send an unarmed boarding party to inspect a recreational vessel which happens to be heavily armed and smuggling narcotics, the consequences could be very damaging to the boarding party and the Coast Guard as well as the

Commanding Officer. Likewise, if the on-scene leader decides to fight a fire using a personally developed approach rather than the standard rehearsed method, the results could be chaos, lives lost, and a severely damaged unit. Essentially, Group I activities have a low risk of goal displacement and low impact if such severity occurs; Group II activities have a high risk of occurrence and a moderate impact; while Group III activities have a low risk of occurrence combined with a high impact if goal displacement does occur.

Table 3 summarizes the environmental factors that exist for each of the three activity groupings. Chapter V will discuss the organizational design which best fits these environmental factors; but as a final element of this chapter, the existing structural design used to control the operational activities needs clarification. Since the WMEC-270 is not yet in commission, the discussion will center on the structural design commonly established on similar classes of vessels such as the WMEC-210 and WHEC-378.

D. ACTIVITY CONTROL

Chapter II identified the top levels of the shipboard organizational design. As addressed in Coast Guard regulations, the Executive Officer and all department heads have the authority and responsibility to report directly to the Commanding Officer on all matters pertaining to shipboard operations. All division officers whether they be commissioned officers

Table 3

Match Between Structure and Environment

Groups / Environmental Factors	I	II	III
Uncertainty	Low	Moderate	High
External Pressures	Few	Many	Few
Interdependence	Low	Moderate	High
No. of Outputs	Few-Quality of completed product easily identified	Many-Quality of completed product moderately difficult to identify	Few-Quality of completed product very difficult to identify
Degree to which resources are shared	Low	Moderate	High
Risk of goal displacement/ severity of impact	Low/Low	Moderate/Low	Low/High

or senior petty officers report to the Commanding Officer through their respective department heads as well as the Executive Officer. Department heads and division officers report directly to the Executive Officer on matters pertaining to shipboard administration and budget which are the Executive Officer's primary areas of concern as specified by Coast Guard regulations. Meetings below the department head level are normally intradepartmental unless they involve the passing of information downwards - general policy statements, Commanding Officer's concerns, and ship's schedule. In essence, the Commanding Officer, Executive Officer, and department heads coordinate the interdepartmental activities and plan major ship activities; individual department heads coordinate interdivisional activities and plan intradepartmental activities.

Voluminous rules and regulations are the primary mechanism used to control behavior and to insure that individuals are working towards organizational goals. Fitness reports are used to evaluate officers on their ability to comply with rules and regulations and to influence behavior in areas not covered by explicit policies. Both the preparing and reporting officer for the fitness report have the opportunity to influence behavior through this mechanism. With the exception of him or herself, the Commanding Officer is the reporting officer for all officers on board the vessel. The Executive Officer prepares fitness reports for all department heads who in turn prepare the reports for their division officers. Enlisted

personnel are also controlled to some degree by their semi-annual evaluations submitted through the chain of command from their immediate supervisor to the Commanding Officer. Enlisted personnel also seek favorable endorsements on advancement recommendations and transfer requests.

The performance of the vessel itself is monitored and controlled by the District Commander, Area Commander, and Coast Guard Headquarters through many different mechanisms. The most common control devices at all levels are rules and regulations issued primarily in the form of Coast Guard Publications, Commandant Instructions, Area Instructions, and District Instructions. In addition, Coast Guard Headquarters uses Command selection boards and officer and enlisted assignment policies to insure top level qualifications; Areas use inspections and visits as well as imposing periodic training requirements on the vessel; and Districts use bi-annual inspections, regular visits, required periodic training, and conferences involving the unit commanding officers and District staff officers in an effort to monitor and control the behavior (performance) of the vessel.

The vessel and the Commanding Officer are evaluated by the District commander while the vessel itself is additionally monitored and evaluated by the Area commander. Evaluation is both objective and subjective. Objective evaluation is based upon quantitative scores assigned to such activities as gunnery exercises, refresher training, and ratio of days underway to

days scheduled to be underway. The subjective evaluation is based upon factors such as comments by District and Area staff personnel concerning their relationship with the vessel, appearance of the vessel during inspections and visits, lack of notoriety with respect to courts-martials, serious injuries, collisions, etc. and a positive public image associated with accomplishments such as successful SAR cases, drug busts, or seizure of foreign fishing vessels.

Formal downward communications between Coast Guard Headquarters, Area and District staffs, and the vessel flows from various staff components directly to the Commanding Officer. Upwards communications flows in reverse; correspondence is signed by the Commanding Officer for operational matters and the Executive Officer by direction of the Commanding Officer for administrative and budget matters. Correspondence from the vessel is addressed to specific staff components rather than the District or Area Commander directly. The staff components would advise the District or Area Commander or Coast Guard Commandant only on issues of major importance. The major function of the communications to the vessel is to influence performance by requiring specific procedures and modifying existing regulations. Communications from the vessel has two primary purposes: to provide input for new policy formulation and to report on compliance to other requests and requirements.

In summary, the WMEC-270 has many operational and operational support missions such as military readiness and routine maintenance

and repair. These missions can be grouped into three categories of activities based upon the degree of intensity and the degree of coordination required. Certain environmental characteristics, important to organizational design considerations can then be attached to each of the groupings. Internally, operational activities are planned and coordinated through meetings involving (normally) the Commanding Officer, the Executive Officer, and the department heads. Performance is controlled or influenced through the issuance of shipboard policies and regulations and semi-annual evaluations conducted on all personnel except the Commanding Officer. Externally, the operational activities are planned and coordinated through periodic meetings between the vessel Commanding Officer and the district staff personnel and through the formal scheduling of major activities such as law enforcement patrols and yard availabilities. Performance is controlled and influenced through the issuance of standard rules and regulations, through the development of training standards, through personnel assignment policies, and through semi-annual evaluations of the Commanding Officer.

Although there is some informal communication between the vessel's department heads, division officers and the staff elements of the District, Area, and Headquarters, virtually all formal communication flows up or down through the Commanding Officer. This is the key position that is primarily responsible for the effectiveness for the vessel or primarily responsible for the ineffectiveness of the vessel.

All of these patterns of communication, evaluation, and control mechanisms comprise the methods by which vessels of a similar class as the WMEC-270 organize, execute, and control their operational requirements. These methods have been in existence for many years and are expected to be used by the new WMEC-270 as they have in the past been used by other WMEC's and WHEC's. Whether this conventional organizational structure is the most appropriate for the WMEC-270 will be the topic of the following chapter.

V. ORGANIZATIONAL DESIGN APPLICATIONS

As a preliminary to determining which structural design is most appropriate for the WMEC-270 given the environment within which the vessel operates, it is important to classify the structure in effect on most Coast Guard vessels and the location of that structure within the organizational design of the entire Coast Guard. One of the five design types, Simple, Machine Bureaucracy, Professional Bureaucracy, Divisionalized, and Adhocracy, will be used to categorize the existing structure and to recommend the desired structure.

A. EXISTING STRUCTURE

The present structure possesses various design parameters related to formalization, specialization, centralization, work grouping, etc. The five classes of structural design also possess specific design parameters which separate the dynamic processes of one structure from another. To match the present structure with one of Mintzberg's five design types, the parameters unique to each design must be identified and then matched with the parameters possessed by the existing structure.

The main design parameters of the Simple structure are centralization and organic structure. Centralization requires the consolidation of decision making power in the hands of a single person at the top of the organization. Organic structure

is most simply defined as the absence of standardization in the organization. (Mintzberg, 1979) Neither of these parameters exist on today's Coast Guard vessels. Personnel management provides a good example of the lack of decision making power on board the vessel. Crew members are transferred in and out of the organization with only occasional input from the vessel. Standardization, influenced through training and the adoption of standard operating procedures, has a strong presence throughout all Coast Guard vessels.

Training, horizontal job specialization, vertical decentralization, and horizontal decentralization are the main design parameters of the Professional Bureaucracy. Training refers to the development of a complex set of skills. Horizontal job specialization means the reduction of large tasks into smaller subtasks. Vertical decentralization is concerned with the delegation of decision making power down the chain of authority. And, horizontal decentralization is concerned with the shift of power from line managers to staff and technical specialists. (Mintzberg, 1979) The first two elements, training and horizontal job specialization, are certainly present on board Coast Guard vessels. But, horizontal decentralization is present only in a limited degree while vertical decentralization is almost nonexistent.

The Divisionalized form is a design used to describe the large organizations that produce diversified products or work with diversified client types. There are clear distinctions

between divisions (generally geographic dispersal) and a certain degree of autonomy afforded each of the divisions (Mintzberg, 1979). While this structure might be appropriate to describe the entire Coast Guard with its variety of missions and operating units, it is not an appropriate design for describing the present vessel structure; nor will it be considered as a design alternative when attempting to determine the desired structure later in this chapter.

Characteristics of an Adhocracy are: highly organic structure, with little formalization of behavior; high horizontal job specialization based on formal training; a tendency to group the people in functional units but use them as needed throughout the organization; reliance on liaison devices for coordination; and selective decentralization. The primary purpose of this structural form is to break away from established patterns of standardization and create an environment where innovation, the development and implementation of new ideas, can flourish. (Mintzberg, 1979) With the Coast Guard's emphasis on standardization through the establishment of rules, regulations, and standard operating procedures, the Adhocracy can be eliminated as an accurate description of the present vessel structure.

Behavior formalization, vertical and horizontal job specialization, usually functional grouping, large size, vertical centralization, limited horizontal decentralization, and heavy emphasis on action planning are the main design parameters of

the Machine Bureaucracy (Mintzberg, 1979). The extent to which rules, regulations, specialized training, and periodic evaluations exist determines the degree to which behavior formalization exists. There should be little argument that a very strong effort is made throughout the Coast Guard to formalize behavior at all levels. Some examples include: basic training, boarding and law enforcement schools, and leadership and management schools.

Coast Guard regulations specify the job requirements of the top level crew such as the Commanding Officer, Executive Officer, department heads, and certain division officers. Planned maintenance systems describe the specific job requirements for certain tasks. First line supervisors normally break the larger tasks down into subtasks assigned to individuals on a daily basis. There are even some specific individuals trained and designated to perform specific support tasks; e.g., repair of refrigeration system and maintenance of radar system. These are all examples of horizontal job specialization. Vertical job specialization is also very apparent in the hierarchial structure of Coast Guard vessels: besides performing their own work, those higher in the organization administer and monitor the work for those below.

While there are some special project committees that have representation from various functions, the major divisional groupings and career paths are based upon functional skills such as the electricians and the cooks (subsistence specialists).

The WMEC-270 is not particularly large in terms of number of people but it is a complex organization in terms of number of subunits and number of activities conducted. And many of the vessel's activities such as personnel selection, operating schedule, and performance evaluation are performed by persons outside the basic organization. If these persons and the vessel's full range of activities are included, the organizational size is sufficiently large enough to be suitable for control by a Machine Bureaucracy.

In recent years there has been a strengthening of formal power at the top as opposed to dispersal of power down the chain of authority. To avoid abuse of power, lower level supervisors are limited in the power they can exercise over their subordinates. Even the Commanding Officer, the lone administrator of nonjudicial punishment on the vessel has his or her proceedings reviewed automatically by the District legal staff to insure proper use of power. In the Coast Guard it is common practice to hold people, not organizational systems, ultimately responsible for the success or failure of an operating unit. As long as this practice continues, vertical centralization is likely to remain in most areas of authority.

Limited horizontal decentralization, the dispersal of power to staff and technical elements, does exist at Coast Guard Headquarters, Area offices, and District offices; and the vessel operations are influenced by this existence. Some examples include the imposition of procedural requirements on the vessel

by District staff elements such as personnel and comptroller even though these divisions are not in the normal chain of authority between the vessel and the District Commander. So, while the Chief of Personnel has no formal authority over the vessel or its Commanding Officer, he or she can control many of the personnel activities on board the vessel through the establishment of district personnel policies.

Action planning does receive a heavy emphasis at both the level of the vessel and at other levels higher within the Coast Guard. There is a heavier emphasis at the lower levels such as the vessel where normal job lengths (tours) rarely exceed 24 months. At the level of Coast Guard Headquarters where tour lengths frequently reach 48 months there is relatively less emphasis on action planning.

The present vessel structure matches most closely with the description of the Machine Bureaucracy with some of the design parameters influenced by Coast Guard units other than the vessel; e.g., horizontal decentralization is imposed on the vessel by District, Area, and Headquarter's staff and technical personnel. It is also important to note that the vessel is an operating unit engaged almost exclusively in mission accomplishment or activities which support mission accomplishment. Virtually everyone on board the vessel from the Commanding Officer to the dishwashers is performing a function dictated by standard policies and procedures established for the vessel not by the vessel. The management functions that are being performed on the vessel

are all related to supervision to accomplish assigned tasks. Thus, the vessel, in its present state, can best be described as a purely operating unit controlled by a Machine Bureaucracy.

There are conditions where the Machine Bureaucracy is the most effective organizational design. As stated in Chapter III, these conditions include stable and simple environment, low degree of uncertainty, high degree of repetition and routineness, limited number of outputs, and low risk of goal displacement. As outlined in Chapter IV, Coast Guard vessels operate under these conditions only during Group I activities. But for a new class of vessel such as the WMEC-270, these conditions may not even exist for Group I activities until they have been performed several times. The Machine Bureaucracy may be the desireable end structure for these activities after they have been performed several times over the first few years of the vessel's life, but it probably is undesireable as an initial point of departure.

The higher degree of complexity and uncertainty and the lower degrees of routineness and repetition for Group II and Group III activities make the appropriateness of the Machine Bureaucracy questionable at best for any Coast Guard vessel and certainly inappropriate for a new and highly sophisticated vessel such as the WMEC-270.

B. ALTERNATIVE STRUCTURES

Since three unique groups of activities have been identified, a recommended optimal structure for controlling each of the

groups will be determined followed by a recommended optimal structure for controlling all of the groups collectively.

1. Group I Activities

For controlling Group I activities (intensive inport activities), the Simple structure is recommended. As previously discussed, the main design parameters of the Simple structure include centralization and organic structure (Mintzberg, 1979). Centralization means that information flows to and from the top, in this case the Commanding Officer, where activities are controlled and decisions are made. Burns and Stalker (1966) labeled the organic structure and identified its characteristics which include:

a. the contributive nature of special knowledge and experience to the common task of the concern;

b. the "realistic" nature of the individual task, which is seen as set by the total situation of the concern;

c. the adjustment and continual redefinition of individual tasks through interaction with others;

d. the spread of commitment to the concern beyond any technical definition;

e. a network structure of control, authority, and communication. The sanctions which apply to the individual's conduct in his or her working role derive more from presumed community of interest with the rest of the working organization in the survival and growth of the firm, and less from a contractual relationship between the individual and a non-personal corporation, represented by an immediate supervisor;

f. a content of communication which consists of information and advice rather than instructions and decisions;

g. commitment to the concern's tasks and to the "technological ethos" of material progress and expansion is more highly valued than loyalty and obedience.

There are two unique features of Group I activities that permit control by the Commanding Officer. First, when these activities occur, there are very few distractions requiring the immediate attention of the Commanding Officer. This permits him or her to be actively involved in all decision making. Second, time is generally not a critical factor in decision making during Group I activities. This again permits the Commanding Officer to be fully involved in controlling the activities. The primary benefit of the organic structure is that ranking personnel; i.e., E-6 and above, will be able to share their expertise, experience, and professional advice directly with the Commanding Officer without fear of reprisal. Every effort would be made to keep communication channels open with more emphasis on professional expertise than rank. While the Commanding Officer would be expected to make all the decisions for this group of activities, all the latest data would be provided to him or her from subordinates as well as from supervisors and staff and technical experts in District offices and Headquarters who maintain regular contact with the Commanding Officer in regard to intensive inport activities such as yard availabilities. Another advantage of the Simple structure for

controlling these activities in that it can easily evolve into the Machine Bureaucracy already established as the appropriate structure for these activities once they have become routinized. This evolution is easy because of the direct access of the Commanding Officer to those people at District and Headquarters who promulgate official policy and because of the authority of the Commanding Officer to issue rules and regulations for areas not already covered by existing regulations issued by higher authority.

2. Group II Activities

There are too many simultaneous operations occurring during Group II activities (routine inport and underway activities) to permit the personal involvement of the Commanding Officer in every decision making process. Following the guidelines of Chapter III the Professional Bureaucracy provides the best alternative structure. Although there is a great deal of complexity involved in coordinating and completing these activities, there is also a great deal of stability; e.g., there is a high degree of repetition involved in such activities as quarterly reports, monthly reports, reenlistment interviews, planned maintenance check-offs, and getting the vessel underway. The main design parameters of the Professional Bureaucracy include heavy emphasis on training, horizontal job specialization, horizontal decentralization, and vertical decentralization (Mintzberg, 1979). The Professional Bureaucracy consists basically of an operating core controlled by individuals

specially trained and well qualified to perform in the job to which assigned. Some examples of the training emphasis are the Boarding and Law Enforcement Officer's attendance at Boarding and Law Enforcement School and the Damage Control Assistant's attendance at Damage Control School. The on-the-job performance of both of these people is strongly influenced by the training they received at the respective schools, and both are probably more knowledgeable in their particular fields than any other member of the vessel's crew. One of the features of the Professional Bureaucracy is that these trained persons will maintain frequent contact with other professionals in the field and incorporate the latest developments that have been found to be more successful in certain situations than previous practices.

Many of the major tasks of the WMEC-270 have over time developed into a group of specialized subtasks in order to improve productivity and reduce the necessary skill level. This procedure is essentially horizontal job specialization. There are many examples of this type of job specialization. First is a towing operation which consists of the WMEC-270 coming along side another vessel and passing the towing hawser to the disabled vessel. In this operation the best helmsman is generally at the wheel, three specific methods for passing the line are prepared with the best personnel assigned to each position - one person would not be expected to handle all three techniques for accomplishing the same task. At the same time, other crew members are engaged in related subtasts which

individually provide very little but collectively support the successful completion of the whole task. A second example involves the fire fighting training. One person handles plotting while another communicates with the bridge, and still another communicates with the repair party. Each person performs a specialized task which makes the whole task easier to understand and control. The third and final example involves the establishment of certain specialized jobs within the command such as the education officer and the drug and alcohol counselor. While these functions could easily be the responsibility of each supervisor with respect to his or her subordinates, the functions are instead performed by single individuals who stay current on all the policies and procedures related to the particular job; e.g., education.

These first two design parameters, training and horizontal job specialization, are already operating characteristics of the organizational structure currently being used on Coast Guard vessels. To convert from the present Machine Bureaucracy to the desired Professional Bureaucracy, the emphasis on training needs to be increased to properly support the structure. (It is interesting to note that the Commandant of the Coast Guard has recently made training the top priority. Commandant's Bulletin, 5-81) The remaining two design parameters, horizontal and vertical decentralization, provide for the major distinctions between the Machine and the Professional Bureaucracy.

As discussed earlier, horizontal decentralization involves the shifting of power from line to staff and technical elements. Although ranking shipboard personnel do not carry these distinctions, Headquarters and District and Area office personnel do possess this distinction. Horizontal decentralization can be accomplished by formally opening the communication channels between staff and technicians outside the vessel and those personnel inside the vessel organization who have been delegated by the Commanding Officer to have the responsibility for executing the staff and technical directives. Opening these official lines of communication would greatly enhance the power of the staff and technicians who would be able to influence the behavior of the people most involved in their programs and would provide more accurate and timely feedback on the success of program modifications. The development of horizontal decentralization offers many advantages such as: closer contact between the developer and the user of specific programs; more accurate information flowing up and down because the user would not be reluctant to pass on "bad news" to someone outside the vessel hierarchy not involved formally in his or her performance evaluation; and the amount of time the Commanding Officer and other senior officers on the vessel spend discussing minor program modifications with District, Area, and Headquarters personnel would be greatly reduced, thus permitting these key people to be more involved in monitoring and influencing the overall effectiveness of the vessel and coordinating the many activities.

Vertical decentralization is concerned with the delegation of decision making power down the chain of authority (Mintzberg, 1979). Vertical decentralization can range from no lower level decision making power to total autonomy for decision making at the supervisor level. For the Professional Bureaucracy, vertical decentralization is closely related to the training parameter previously discussed. The expectation is that persons brought into the system are fully trained and indoctrinated in the work requirements and then given considerable control over that work. The extent to which the training expectation is true determines the extent to which control over work is delegated. For example, a new Engineering Officer or Chief Petty Officer may be granted considerable work control due to the extent of training and experience in his or her career; a new Ensign or Junior Petty Officer may require several months of close observation and evaluation feedback to establish the desired level of expertise prior to being delegated decision making power. The people who have received delegated decision making authority are expected to upgrade their level of expertise by staying current on all new developments in their respective fields. Changes of major significance would be brought to the attention of the Commanding Officer who would otherwise act as the primary coordinating and evaluating mechanism for all required activities. As a professional, the Commanding Officer would also be responsible for improving his or her management and motivational skills.

Establishment of a Professional Bureaucracy will require some changes to the internal and external patterns of communications, evaluation, and control. Communications flow down to key persons; e.g., department heads and division officers, from two main sources. The Commanding Officer would pass down personal policies, areas of concern, and future plans. District, Area, and Headquarters staff and technical elements would pass down instructions and recommendations for task accomplishment. This latter information would by-pass the Commanding Officer except that major policy and procedural changes will be brought to the attention of the Commanding Officer. Evaluations would still be performed primarily by the Commanding Officer who will permit greater influence from staff and technical elements and less influence from hierarchial levels; e.g., a division officer would be evaluated less on how he or she supported the department and more on how he or she converted professional training and experience into benefits for the vessel. Control over activities would be accomplished through lateral relations between people involved in the various activities. People determined to be weak would undergo additional training to upgrade professional stature. Programs determined to be weak would be given special emphasis to upgrade vessel performance. Staff and technical people would develop a closer relationship with vessel personnel who are new on the job or observed as needing closer supervision and more distant relationships with the more qualified people who have generally

been on the job for a longer period of time. Periodic reports would still be submitted on a routine basis and would continue to be useful in monitoring and controlling the vessel's performance.

3. Group III Activities

Based strictly on the environmental factors already identified as deserving consideration when designing organizations, the Adhocracy would be the optimum structure for controlling Group III activities (emergency operations). The high degree of intensity, high need for extensive coordination, and the unique nature of each emergency situation make the Adhocracy the preferred controlling structure. The Adhocracy has many similarities to the Professional Bureaucracy such as decentralization and emphasis on highly trained professional personnel, and to the Simple structure such as organic. But, the major advantages of the Adhocracy lie in its differences from all other organizational designs. The major difference is that it encourages and prefers innovation over standardization. All other structures attempt to develop standardization through such devices as training, rules and regulations, and direct supervision. The Adhocracy uses standardized training as a base from which to draw knowledge and skills for the purpose of developing new knowledge and skills. There are few situations where the Adhocracy would be effective without creating chaos. Group III activities represent one of those situations for the following reasons.

First, each emergency situation is unique with different factors deserving consideration and concern. For example, one fire may have similar characteristics but these similarities are not as important as the differences which might include location with respect to ammunition and fuel storage, number of personnel presently endangered, and the types of equipment available for fighting the fire. It is unlikely that all the possible contingencies could be planned for through training exercises. Consequently, innovation - the development and application of new methods - becomes very important.

A second reason for controlling Group III activities with an Adhocracy involves formal communications. During intense emergencies there are often breaks in normal channels of communication. This could require independent actions from people normally accustomed to responding to specific situations and instructions. A rescue and assistance team on board another vessel, for example, may be highly trained to handle emergencies while able to communicate with the base ship and receive specific instructions. Once the communications are broken, the team must be able to rely on its own training and experience rather than on standard operating procedures to adapt to unique circumstances.

A third reason is that when an emergency activity is begun there is no clear picture of what the finished product should or would look like. Consequently, decisions are made in a manner which does not relate the present state to some

future state. While some alternative outcomes may be considered, decisions are based primarily on the present state and all the factors involved in that state.

A fourth and final reason to be discussed for preferring the Adhocracy for controlling Group III activities is the availability of personnel during an emergency situation. It is very rare that all personnel would be available to perform their assigned functions during an emergency. Crew members can be on leave or liberty, not available for duty (sick), or casualties of the emergency. Following standard procedures in such situations can only produce delays and loss of effectiveness. Only through rapidly developed innovative actions will the vessel be able to overcome the emergency.

Although the Adhocracy may be the optimum, there are environmental factors particular to the WMEC-270 and other similar class vessels that require a structure with a little more control, the Professional Bureaucracy. Two of the most important factors are the Coast Guard's personnel rotation policies and the frequency with which emergency activities are conducted.

In the Adhocracy, crew members develop respect, authority, and trust based upon their performance and their display of professionalism rather than on the position they hold within the organization. The respect and trust are particularly important and give rise to authority for certain people in certain situations. If respect and trust are insufficient then only

the power of the position remain - and in an emergency that power may not be sufficient to control the activity. The more often people are transferred the more difficult it is to develop respect and trust among crew members. An example of this can be seen on board Coast Guard vessels as a result of the alternating rotations of the Commanding Officer and the Executive Officer (one rotates one summer and the other the next summer). While some crew members may be quick to test the new Commanding Officer, most will rely on the Executive Officer for making decisions and influencing policy. After a time the Commanding Officer will develop the respect and trust he or she needs to participate actively in the decision making and planning processes. If the rotation policies change the Adhocracy may become practical and therefore optimum. Or, the new WMEC-270's may be a unique case because of the length of time many of the crew members are together as part of the precommissioning detail. The amount of training and other shared experiences during this time period may make it possible to develop an Adhocracy once the vessel begins operations.

The second environmental condition that reduces the potential of the Adhocracy for controlling Group III activities is that these activities occur infrequently. While it is possible to develop the respect and trust necessary for an Adhocracy during less intensive activities (Group II), it is best that they are developed during the activities in which the respect and trust will be converted to increased authority for the sake

of promoting innovation. If the frequency of emergency activities were ever increased, maybe as a result of another Vietnam-type conflict, the Adhocracy would become the preferred structural design. As long as there is no change to the frequency of occurrence or the tour lengths, the Professional Bureaucracy would remain the most practical design.

Table 4 summarizes the match of organizational structure to activity grouping. The structures shown in parentheses represent the true optimum if certain conditions unique to the WMEC-270 (already discussed) change; e.g., tour lengths or routinization of Group I activities. The remainder of the chapter will discuss the optimum design for all three groupings.

C. DESIGN STRATEGIES

To control all vessel activities there are three major options. First, one of the three optimum designs can be selected recognizing that it may have certain disadvantages in one or two of the activity groupings. Second, an entirely new structure could be designed which incorporates the advantages of all three designs and minimizes the disadvantages. Third, the process by which the organization can shift its structure from one design to another without creating confusion could be developed.

1. Option 1

Since the Professional Bureaucracy has already been identified as optimum for Group II activities and suitable for

Table 4

Proper Match Between Activity Grouping and Structural Design

Activities		Structural Design
Group I	(Intense Inport Activities)	Simple (Machine Bureaucracy)
Group II	(Routine Inport & Underway Activities)	Professional Bureaucracy
Group III	(Emergency Operations)	Professional Bureaucracy (Adhocracy)

Group III activities, it is likely that this design would be selected for controlling all vessel activities provided this option were selected. It is important to remember that each structural design possess certain benefits and disadvantages with respect to the other designs depending on which activity grouping they are matched with. Table 5 summarizes the relationship between the structural design and the activity groupings. The Machine Bureaucracy is listed instead of the Simple structure for two reasons. First, the Simple structure is expected to evolve over time into the Machine Bureaucracy. Second, it provides an opportunity to compare the Machine Bureaucracy (the design presently being used by Coast Guard vessels) with the Professional Bureaucracy and the Adhocracy.

2. Option 2

If the second option, developing a new hybrid structure which incorporates the benefits of the three designs, is desired, then figure 11 represents such a design. The Executive Officer, Engineering Officer, Operations Officer, and Weapons Officer are the key to this design. They would serve outside the normal hierarchial chain and act as primary coordinators between the functional groups; e.g., Engineering department and the task groups; e.g., damage control team. The dotted line connections represent strong communication links and weak supervisory links. The degree to which these members of the crew served as coordinators would vary depending on the type of activities being performed. During Group I activities the

Table 5

Benefits and Disadvantages of Structural Design Alternatives

	Group I	Group II	Group III
Machine Bureaucracy	Benefits - Top level control; jobs broken down into small subtasks; lesser degree of professional training required; line control.	Disadvantages - Requires too much of CO's valuable time to control all activities; inhibits the development of middle mgrs.; limited communication channels for passing large amounts of information.	Disadvantages - Overloads CO; creates time delay for critical decisions; crew follows rules blindly whether they apply or not.
Professional Bureaucracy	Disadvantages - Too much staff and technical power; personnel overtrained; inadequate CO control; routine tasks not sufficiently specialized.	Benefits - Limits the requirement for publishing volumes of regulations that are difficult to maintain in a timely manner; reduces information going to CO; effectively utilizes professionally trained personnel.	Disadvantages - Could cause standard response to nonstandard situation; too much staff and technical emphasis for line activities.
Adhocracy	Disadvantages - too much time spent in lateral relations when following standard procedures is adequate; personnel are overtrained and underutilized.	Disadvantages - Innovation not desireable when there are so many standardized procedures for effectively dealing with routine maintenance and repair and personnel admin.	Benefits - Decentralization to lowest levels where decisions need to be made; innovative responses to new situations; helps CO to look at big picture.

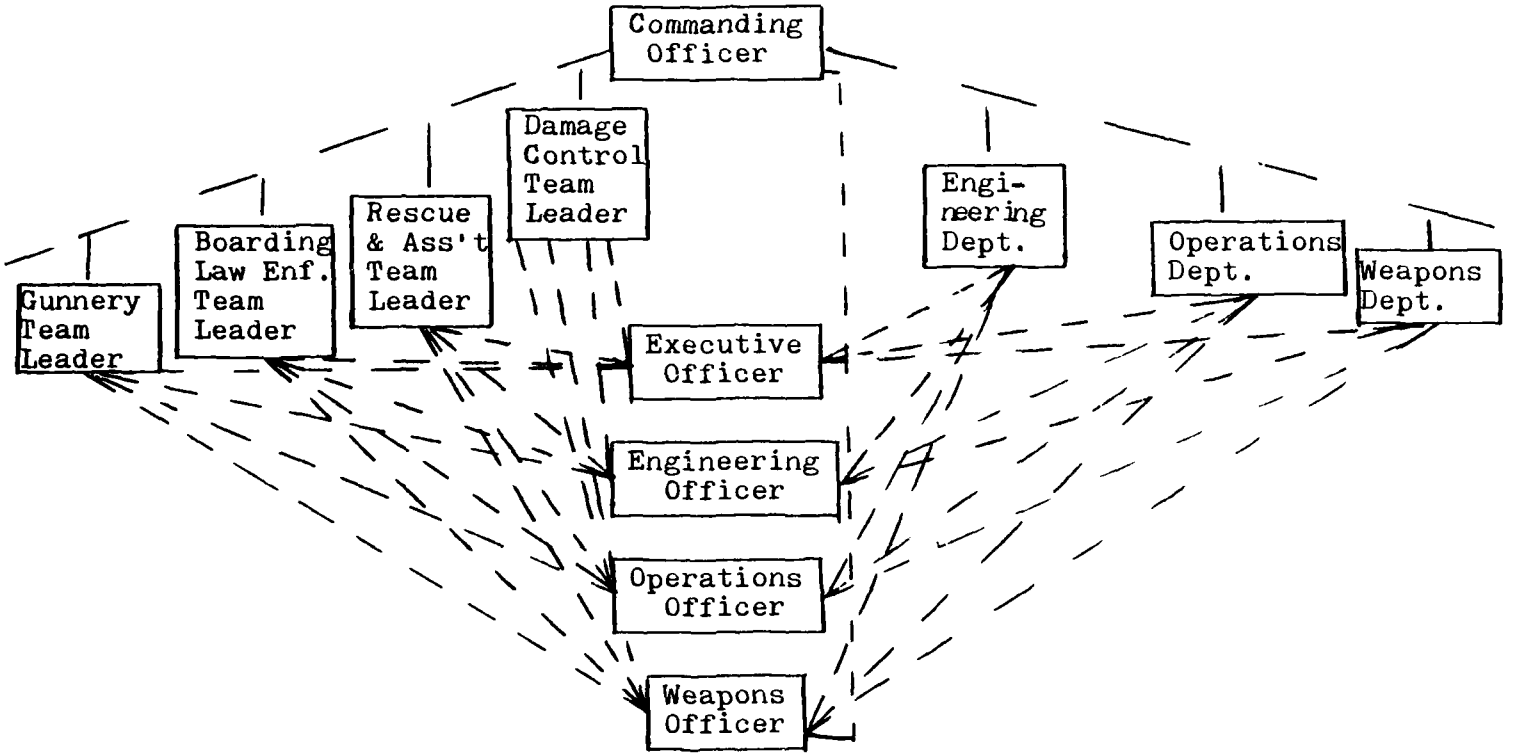


Figure 11

Proposed Hybrid Structure for WMEC-270

task groups are largely ignored and the four coordinators insure that all the information from the functional groups is passed up to the Commanding Officer and that the tasks being performed are in accordance with the established regulations and properly supervised at the lower levels. The four coordinators would serve to balance the emphasis between the two groupings during Group II activities. They would insure that the expected degree of professionalism was present among crew members or take action to improve that level. They would also insure that only the most important information was being transmitted along formal communication channels. Group III activities could require a high degree of coordination particularly since standard procedures are not always observed or even desired. The four coordinators would fulfill this requirement for sufficient integration of all the subtasks that comprise the emergency activity. They would also serve to recognize, encourage, and reward innovative behavior during these activities.

The particular advantage of this second option is that the hybrid structure provides the morphogenic capability identified earlier in this thesis as an important though rarely mentioned design parameter. Consequently, the structure would be able to change patterns of communication, supervision, and evaluation as the environment changes.

3. Option 3

The third option would be easy to introduce but difficult to maintain effectively. From the introduction standpoint

it is generally clear what activities are ongoing at any one time. Group I and Group III activities have been characterized as having distinct beginning and end points. Whenever neither of these activities are being performed, it can generally be assumed that Group II activities are being conducted. The difficulty of effectively maintaining the continuous transition stems from the necessity to insure that all middle and high level members of the crew are indoctrinated in the three structural designs and feel comfortable working in all three climates. Over time this could create problems for some members of the vessel's crew who might prefer one design over another or be better indoctrinated in the use of one design as opposed to another.

Each of these options has relative advantages and disadvantages which are dependent almost entirely on factors related to the vessel's crew and Commanding Officer. Some examples include: degree of professional training, percent of personnel allowance on board, and how comfortable the Commanding Officer and other crew members are with more complex structures which provide multiple communication channels. It will ultimately be the responsibility of the Commanding Officer to select that option which is best suited to his or her organization. If no change is made, then the Commanding Officer should understand that option one is in effect utilizing the Machine Bureaucracy to control all three activity groupings despite its shortcomings in controlling two of the activity

groups. Reasons for selecting some other option or at least some other design in option one is the subject of the following chapter.

VI. CONCLUSION

There are two major reasons for considering changes to the long established Machine Bureaucracy: technology and people. It is the purpose of this final chapter to examine what effects these two factors have on organizational design and vice versa.

A. TECHNOLOGY

Technology both influences and is influenced by organizational design. The degree of complexity should be the greatest source of technological influence. If the task to be performed is simple or can at least be broken down into simple subtasks then it can be easily controlled through rules and regulations and direct supervision. This also permits a high ratio of workers to supervisors which reduces manpower costs. The Machine Bureaucracy would be ideal for this and similar situations. When the tasks are nonroutine, possess a high degree of complexity, require a high degree of integration, and cannot be clearly defined, the organization is difficult to bureaucratize. In these more complex cases, more discretion must be given to lower level personnel who will rely on their experience and professionalism for task direction (Perrow, 1972). The Professional Bureaucracy or even Adhocracy would be best suited for controlling this type of technology.

For Coast Guard vessels, the tasks in recent years have become increasingly complex and less routine. The WMEC-270

should accelerate this trend particularly since many of the most routine functions have been automated; e.g., milstrip requisition and sounding tanks. Some tasks considered routine by other vessels will be initially nonroutine for the WMEC-270 because it is a new class of vessel; e.g., ordering commissary supplies because the vessel has limited reefer capacity and microwave ovens. Many organizations will attempt to routinize their operations and the Coast Guard is no exception. Group I activities are examples of this type of routinization. But beyond these activities (Group II and III) there is less and less opportunity for routinization of tasks. The Coast Guard has taken on more missions over the years and is still shifting emphasis as events such as the Cuban refugees and the 200 mile fishing boundary require. The WMEC-270 will be performing most of the present Coast Guard missions and probably some additional missions not yet the responsibility of the Coast Guard. The frequency with which the Coast Guard revises its publications is a prime example of how difficult routinization is under present environmental conditions which are frequently complex and unstable. Under such conditions, the Professional Bureaucracy, the Adhocracy, and even the Simple structure would be much preferred over the current Machine Bureaucracy because of their leanings toward decentralization (Professional Bureaucracy), organic structure (Simple), or both (Adhocracy).

Technology is also influenced by organizational structure. In a Machine Bureaucracy, for example, the supervisor wants

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to be sure he or she is in control of what subordinates are doing and how they are doing it without having to be continuously present. Consequently, the trend will be toward standardization and repetition. Supervisors will reward (sometimes even unconsciously) performance that is the same as they wanted it done and the same as they would have done it. It is often not realized by supervisors and managers that tasks used to be performed under a different set of environmental factors. There were more people, a higher budget, simpler technology, and less emphasis on personnel welfare. Many of the standardized procedures developed under those environmental conditions are no longer optimal or even suitable yet it will be difficult for change with the current organizational structure which supports that standardization philosophy. Earlier in this thesis the Coast Guard Commandant's call for more innovation was referenced. Innovation doesn't just happen. It requires a flexible structure that reduces centralization, direct supervision, and standardized operating procedures wherever possible. While the Professional Bureaucracy and Adhocracy will not bring about innovation by themselves, the adoption of these structures will help to create an atmosphere where innovation can flourish and will support other Coast Guard efforts to improve managerial innovation such as the Leadership and Management Schools. The way in which tasks are performed, people are supervised and managed, and organizations are designed are all examples of technologies - technologies which will not change

in any systematic way until all are changed to support one another.

B. PEOPLE

People, also, both influence and are influenced by organizational structure. The simplest example is that people who control an organization; e.g., owner or board of directors, can select any structural design desired. But, people lower in the organization can also influence the structure. They can do this by the way in which they choose to interact with one another. An example would be an Adhocracy which attempts to foster innovation but supervisors base their evaluation and reward mechanisms on standardization and formalization. The Adhocracy would quickly evolve into a Machine Bureaucracy. People can also introduce decentralization by simply forcing the problems back down for action. This could be risky since decentralization needs to be related to a high degree of training to insure that those people ending up with the decision making authority also possess the expertise to make those decisions.

Because organizational structure affects how people interact with one another to accomplish tasks and because the structure affects how much freedom an individual will have to develop his or her talents, people are influenced by the structural design. Structures with high degrees of formalization and standardization will tend, over the long term, to attract

people that prefer that climate. In time, the workers will follow the rules for the sake of the rules themselves, since this is the basis on which they are evaluated. People in decision making positions tend to create more rules when new situations arise. Workers will attempt to avoid autonomy and decisions which are associated with risk taking (Hall, 1972). There are organizations and people who prefer this type of rigid environment. Those people who don't, will generally either adjust their preferences or opt out of the organization rather than remain discontent. Unfortunately, this latter option is not always available for Coast Guard personnel who often have obligated service or feel economically trapped after 15 or 16 years by the 20 year retirement system. Consequently, they either adapt their behavior to following the rules for the sake of the rules, develop an attitude of discontent, or both. Members of decentralized and organic structures who find themselves ill suited can also opt out or they can attempt to develop a more innovative and interactive approach to their performance - the types of behaviors encouraged by these structures.

C. ORGANIZATION EFFECTIVENESS

Duncan (1979) has identified three symptoms which provide an indication that the organization and its structure are mismatched. The first is decision making. When the structure does not match the needs of the organization, decisions will

be inadequate. Decision makers will be unable to anticipate problems, predict future trends, or generate sufficient information to make confident and accurate decisions. The second is problem solving - the organization simply is unable to develop new techniques for overcoming problems. The third symptom is personnel dissatisfaction. Individuals could be experiencing role conflict as a result of too much standardization or they could be experiencing role ambiguity as a result of insufficient standardization. Top level managers can make important contributions to their organizations by watching for these symptoms and taking corrective action as necessary to improve the organization's dynamic processes.

Ultimately it will be the responsibility of people who have the authority to design structures (in this case the WMEC-270 Commanding Officer) to develop the structure which not only provides the best control over the required tasks but also helps to develop the type of personnel the organization desires - people who prefer standardization and formalization or those who prefer professionalization and innovation. If people truly are the Coast Guard's most valuable resource then organizational designs such as the Professional Bureaucracy and the Adhocracy which promote the development of that resource must be preferred to designs such as the Machine Bureaucracy which inhibits the development of that resource.

I believe that personnel are the Coast Guard's greatest resource and that organizational structure is a technology which can affect the development and utilization of that resource.

The delivery of the new WMEC-270's offers a unique opportunity for the Coast Guard to determine through realistic experiments the optimum structural design. Since the first four vessels are the same age, perform the same missions, and have the same homeport, each could select or be assigned a different design alternative; e.g., Machine Bureaucracy, Professional Bureaucracy, new hybrid structure, or different structures for each group of activities (option 3).

Over time, the performance of each vessel could be measured through such factors as retention, crew satisfaction as determined through survey data, operational conduct, and subjective evaluation. While there may be some intangibles which affect performance variances (if any) such as the differences in the Commanding Officer's leadership styles, much of the variance will be attributable to structural design distinctions.

This opportunity to experiment may not come again for many years. Failing to take advantage of this opportunity would deny the Coast Guard a chance to engage in the implementation of innovative management techniques. Taking advantage of this opportunity may not cost much and may generate substantial benefits. Moreover, it would be a visible display of the Coast Guard's concern for its personnel resource.

I believe strongly that if the experiment is undertaken, the Machine Bureaucracy will prove less effective than other alternatives, but I believe more strongly that the Coast Guard should not pass up this unique opportunity to conduct this experiment.

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